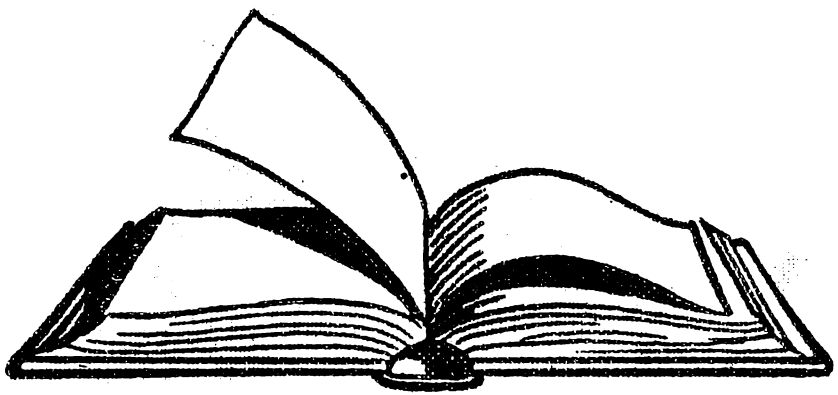
M. ILIN

BLACK on WHITE

The story of Books

BLACK ON WHITE



M. ILIN

BLACK ON WHITE: THE STORY OF BOOKS

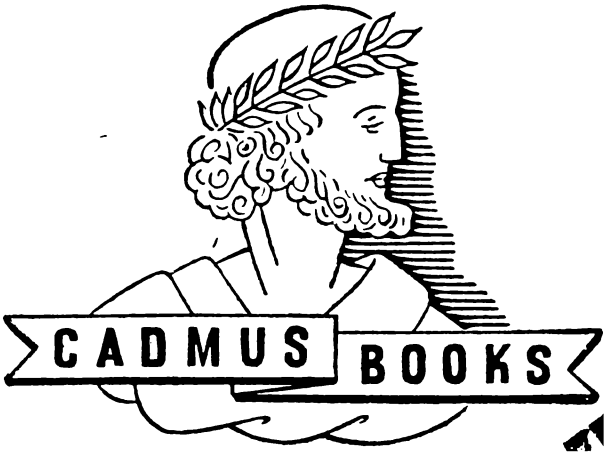
BY M. ILIN

Long ago there lived in Rome a very rich man named Itellius. He was also a very ignorant man. Itellius liked to give big dinners and invite learned guests. Naturally the conversation at these dinners was witty and wise. But rather than make the effort to become educated himself, Itellius thought of an original way to keep up his end of the conversation. He ordered two hundred of his brightest slaves each to learn a famous book by heart. Then, whenever there was a gap in the conversation, the butler would motion to one of these slaves. The slave would step forward and recite a part of the book he had learned.

Itellius was delighted. His "living library" was the talk of Rome. But one day something happened that made this rich ignoramus the laughing stock of the town —something that made him wish he had learned a bit about books himself instead of depending on his "living library."

The books that Itellius' slaves learned were not books like ours at all—they were ribbon books. If Itellius had lived in Babylon instead of in Rome, his books would have been clay books. Every one of these precious books was written by hand but in so many different ways that it is amazing to read about them.

Did you know that common, ordinary paper was used by the Chinese two thousand years ago? That "pen knives" were knives to cut pens with? That picture writing was used by the old Egyptians and also by our American Indians? That every one of the letters of our alphabet was developed from the picture of something? The story of books—noting in the world is more fascinating than this.


CADMUS BOOKS

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* * * * *

BLACK ON WHITE

The Story of Books

M. ILIN, who wrote New Russia's Primer *and* What Time Is It?, *is a young Russian engineer, brother of Marschak, the famous Russian poet and story-teller. Both brothers belong to a group of writers who are studying science and history and Soviet life and writing books not only for Russian children but for workers in factories and for peasants. Some of the members of this group are artists, one used to be a cook in the Red Army, two are former homeless children. All of them work together trying to make simple stories about the real world we live in.*

BLACK ON WHITE

The Story of Books

M. ILIN

Translated by Beatrice Kincead

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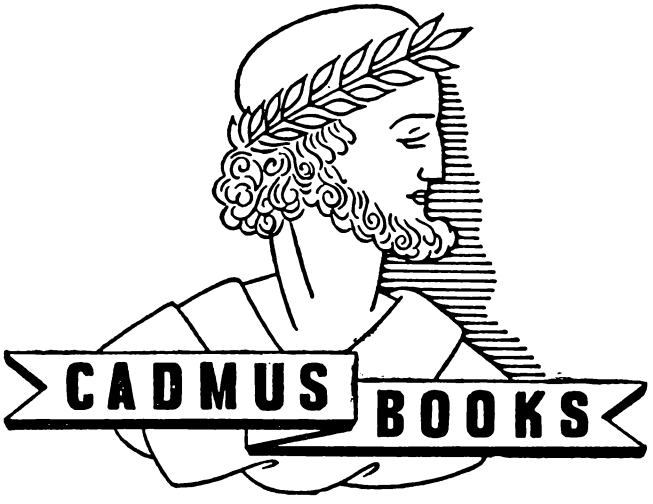

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BLACK ON WHITE

The Story of Books

PART ONE

CHAPTER I

A Living Book

WHAT did the first book look like? Was it printed or written out by hand? Was it made of paper or of some other material? If it is still in existence in what library can it be found?

They say that there really was a man once so foolish as to hunt through all the libraries of the world for the first book. Day after day he searched among heaps and stacks of mouldy books, yellowed with age. His clothes and boots were covered with a thick layer of dust as if he had been travelling for miles along a dusty way. Finally he met his death falling from a high step ladder leaning up against the book shelves. But if he had lived a hundred years longer, nothing would ever have come of his search. The first book rotted away in the ground many thousands of years before he was born.

The first book was not in the least like a book of

to-day. It had hands and feet. It didn't lie on a shelf. It could talk. It could even sing. To make a long story short, it was a living book—a human book.

In those days people could not write. But their memories were much better than ours. Some of the old people were actually living books. They told marvellous stories about the olden times. Stories which had been told them in their own childhood. These people died but their stories lived on—handed down from father to son, from grandfather to grandchild. The stories changed as they passed from mouth to mouth. Some things were added and some things forgotten. They were smoothed and polished by time just as stones are polished by running water. The legend of some brave chieftain would be changed into a fairy tale about a giant who feared neither arrow nor spear—who could range the wood in the form of a wolf and fly through the air in the form of an eagle.

In far-off corners of the world to-day there are still old men and women story tellers who relate happenings which have never been written down—fairy tales about giants.

Long, long ago in Greece they used to sing the Iliad and the Odyssey, stories about the war of the Greeks and the Trojans. And it was a long time before these tales were finally written down.

A singer or *aëdos,* as the Greeks called him, was always a welcome guest at a feast. There he sits against a tall column. His lyre hangs on a peg over his head. The feast has come to an end. The huge trenchers of meat are emptied. Emptied are the bas-

The Greek Aëdos

kets of bread. The two-handled golden goblets have been carried out. The feasters have eaten; they have drunk their fill. Now they want to hear some singing. The *aëdos* takes his lyre, strikes its strings, and begins the great story about the wily king Odysseus—about Achilles, brave in battle.

The songs of the *aëdos* were good, but our books are better still. For a dollar or less we can buy a

volume of the Iliad which fits easily into the pocket. It asks for nothing, neither food nor drink, and it never gets sick and dies.

This reminds me of a story.

Story of a Living Library

Once upon a time there was a rich man living in the city of Rome. His name was Itellius. Marvellous tales are told about his fabulous riches. His palace was so big that it would hold everybody in the whole city. Every day some 300 people gathered round his dinner table, the most prominent and learned citizens of Rome. There was not merely one table, there were thirty of them, covered with handsome cloths of golden brocade.

Itellius fed his guests on the daintiest of foods. But in those times it was the custom to entertain one's guests not only with fine food but also with interesting, witty conversation. Books existed in those days, copied out by hand. And many people sat long hours reading these books so as to be admired later by the guests at some dinner party for their interesting stories and witty conversation.

Itellius had a great plenty of everything. There was only one thing he lacked—education. He could barely even read. People who were glad to dine at

his table secretly made fun of him. He couldn't hold the conversation at table. If he managed to get in a word, he noticed that his guests did not hide their smiles.

This he could not bear. But he was too lazy to sit for a long time over a book. He wasn't in the habit of working hard at anything. He pondered for a long while about how to mend matters and finally had an idea. He commanded his butler to select from among his numerous slaves 200 of the brightest and best educated. Each one of them was ordered to learn a certain book by heart. For instance, one had to memorise the Iliad, another the Odyssey, etc.

It was a hard job for the butler. Many a beating he had to give to the slaves before Itellius' orders were finally carried out. But now Itellius did not need to work. He did not have to try to read books himself, for he had a living library. At dinner, when the time for conversation came round, all he had to do was to motion his butler, and from the crowd of slaves standing in a silent row about the walls, one stepped out and recited a suitable passage. They named the slaves according to the book each one had memorised: Iliad, Odyssey, Æneid, etc.

Itellius was very pleased. His living library was the talk of Rome. But his satisfaction was short-lived. One fine day something happened that made

the millionnaire ignoramus the laughingstock of the town.

After dinner the conversation, as usual, turned to the discussion of all kinds of learned topics. They

Itellius and His Living Library

were talking about how people feasted in ancient times.

"There's a famous passage about that in the Iliad," said Itellius, and motioned to his butler.

But the butler, instead of motioning to the slave, fell to his knees, and in a voice shaking with fear, said:

"Excuse me, my lord. Iliad has a stomach ache to-day!"

This happened 2,000 years ago. And even to-day, in spite of our many libraries we still cannot quite get along without living books.

If we could learn everything from books we should never need to go to school. We should not have to have teachers to tell us about things and explain them to us. You can't ask a book about anything. But a teacher you can always ask to explain things that you do not understand.

Living books are still useful to us, but living writing is of no earthly use any more. In olden times, when people couldn't write, there were, naturally, no regular mail carriers. When people had to send some important news they sent a messenger who would repeat, word for word, what had been told him.

What if we had messengers in place of postmen? You'd hardly find a man who could memorise several hundred letters a day. And if there were such

a person it wouldn't work out well anyway. Suppose, for instance, such a postman were to come to John Smith's on his birthday. The master of the house himself opens the door, as he is expecting guests.

"What do you want?"

"I have a letter for you. This is what it says:

DEAR MR. SMITH:

Many happy returns! Have you been married long? Appear in court at twelve o'clock to-day. I wish you would come to see us oftener. . . ."

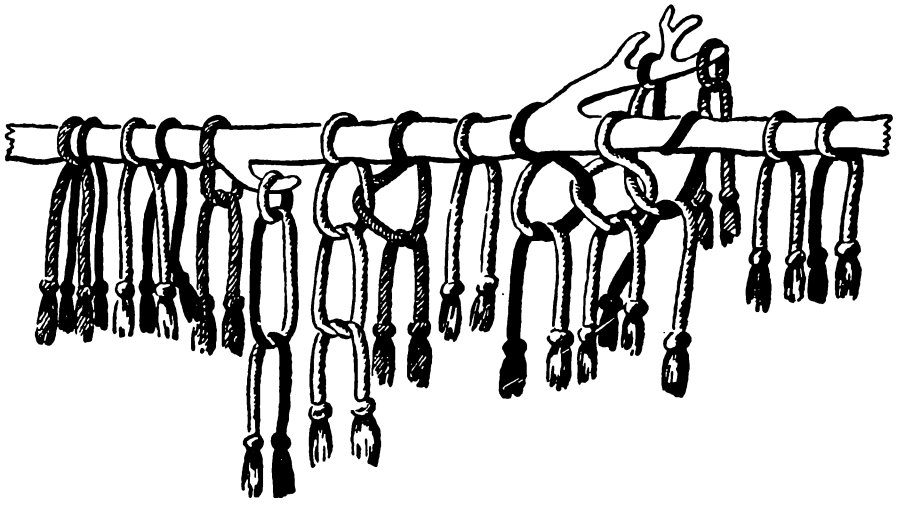
John Smith is speechless with amazement. But the poor postman, who has got his hundreds of letters all mixed up in his head, goes babbling on like a machine that has been wound up. . . .

CHAPTER II

Memory Aids

I KNOW an old man, a good-natured, accommodating old fellow. To look at him, you'd never give him his eighty odd years. His eyes are bright, his cheeks rosy, and he walks as briskly as a young man. Everything would be fine, only . . . his memory is failing. He goes somewhere and forgets what he went for. He never can remember names and although I've known him for a long time he often calls me by the wrong name.

If you ask him to do an errand for you, he'll ask you about it over and over and try to fix it on his



Knot-Writing

memory. And to make sure that he doesn't forget he ties a knot in his handkerchief to remind him of it. His handkerchief is always all tied up into knots. But these knots don't help him a bit. He takes out his handkerchief, there are a dozen or so knots in it—but he hasn't the least idea what they stand for. Even a man with the best of memories would find it hard to decipher a book written in this astonishing way.

It would be another matter if our old man had different kinds of knots, and each knot stood for a certain letter or word. Then any one could help him decipher his memory knots.

And there used to be just such knot-writing, before people knew how to write. The ancient Chinese

"wrote" in this way. So did the Persians and Mexicans. The inhabitants of Peru, in South America, were especially skilled in this difficult kind of writing. Even to-day we sometimes find shepherds in that country who know the language of knots.

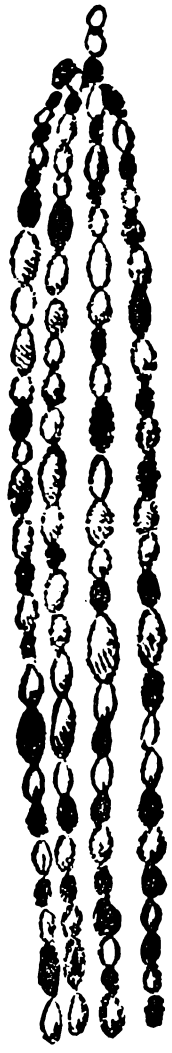
The nearer a knot was to the stick on which they were tied the more important the matter to which it referred. A black knot meant death. A white one, silver or peace. A red one, war. A yellow one, gold. A green one, grain. If the knot was not coloured at all it stood for figures: single knots were 10's; double ones 100's; triple ones 1,000's.

It was no easy task to read such a letter. You had to notice the thickness of the cords, how the knots were tied, how they were arranged. Just as our children learn the alphabet Peruvian children in those days had to learn the knot alphabet—or *"kvipa."*

Other Indians, the Hurons and Iroquois, had beads of different coloured shells for letters, in place of knots. They sawed the shells into little flat beads and strung them on a cord. They made whole belts of these strings of beads.

Here, too, black signified something unpleasant—death, misfortune, a threat. White stood for peace; yellow for gold or tribute; red for war or danger. These colours have kept their old meanings down

to our day. A white flag is still the emblem of peace, just as it was then. Black is the symbol of mourning, red of rebellion.



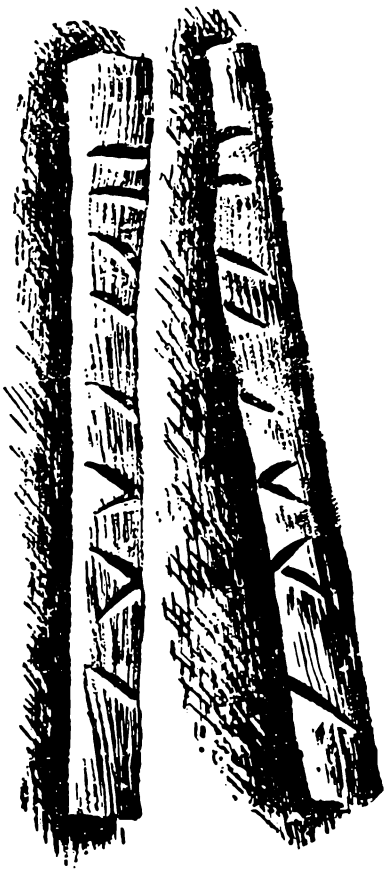
In the Navy they have made a whole alphabet of flags. Ships talk to each other by means of flags strung on a mast.

And what are signals on a railroad? Here, too, the colours have kept their original meanings.

It wasn't easy to make out the meanings of these coloured shells. Chiefs of tribes had whole bags full of shell belts. Twice a year the young men of the Iroquois tribes gathered somewhere in the woods to be taught the secrets of the shells by the learned elder chiefs of the tribes.

When an Indian tribe sent a messenger to another tribe he carried with him these coloured belts, "wampum."

"Hear my words, chiefs," he would say, "and look at these shells!" holding up the many-hued belt, gleaming with all colours of the rainbow. Then he would make his speech pointing to a shell at each word.



Without an oral explanation it was hard to understand the wampum. Suppose there were four shells hanging on one string; a white, a yellow, a red, and a black one. The letter might be: "We will enter into an *alliance* with you if you will pay us a *tribute;* but if you do not agree to this we shall make *war* on you and shall *destroy* you. Or you might interpret it in quite another way: we ask for *peace* and are ready to pay you *gold;* if the *war* continues, we shall be *destroyed.*

To prevent mistakes every Indian who wrote a shell letter had to deliver it himself and read it aloud. The letter could not take the place of a per-

son. It could only help him, remind him of what he had to say.

There were many such memory aids. For example, to count the number of sheep in a flock or the number of bags of flour on hand, people made notches on sticks. Serbian peasants still use sticks in place of account books and bills. Suppose a peasant has bought from a merchant, on credit, four bags of flour. In place of writing a receipt he smooths off a little stick and cuts notches in it, four big ones, and one little one. Then he splits the stick in two lengthwise, and gives half of it to the merchant and keeps the other half himself.

When the time comes to pay the debt, the two halves are placed together. There's no chance for cheating—the notches show right away the amount of the debt.

People used to keep track of the days by making notches in sticks too. That's the kind of calendar Robinson Crusoe had on his desert island. And we have all heard how the "bad men" in the early days of the wild west made notches on their guns for each victim.

CHAPTER III

Talking Things

It took wise men to interpret the meaning of knots and shells. There were much simpler ways of writing down events or sending messages. If a tribe

A Peace Message

wanted to declare war on another tribe they would send them a spear or an arrow. It was clear to anybody that this present smelled of blood.

If it was a question of peace they used to send

tobacco and a pipe with it. A pipe was always a symbol of peace among the Indians. When they assembled to discuss peace the leaders of the hostile tribes sat around a camp fire. One of them would begin to smoke a pipe, then hand it on to his neighbour. In solemn silence the peace pipe would go round the whole circle.

Before they learned to write people used to make

An Early Scythian Message

whole letters of things. The Scythians, ancient inhabitants of southern Russia, once sent the Persians a letter consisting of a bird, a mouse, a frog, and five arrows. The meaning of this strange collection was: "Persians! Can you fly like a bird, hide yourself in the ground like a mouse, leap through swamps like a frog? If you cannot, then don't try to go to war with us. We shall overwhelm you with arrows the moment you set foot in our country."

How much simpler and more readable our letters

are! What if some fine day you got a package in the mail in which, in place of some nice things, you found a dead frog or something like that? You would, of course, think some one was trying to play a low trick on you and would never in the world imagine that it was not a joke but a serious letter.

A letter made of things seems as strange to us as one written on paper would to some savage. I'll tell you a little story about such a savage.

The Tell-Tale Paper

Once upon a time there was a negro named Sambo. He had never in his life seen a white man. A white man was as much of a rarity to him as a white crow would be to us. But one day Sambo saw a white man. And not only one but many of them. Some white men came to his native village and gathered up all the strong young men and took them far away, far away—clear to the sea. There they put Sambo and his friends into a big house that sailed over the water.

One day went by, then another and another, many of them, until finally Sambo caught a glimpse of the land again. But this land was not at all like his native land.

They took Sambo to a big white stone house.

WALDO
HIGH SCHOOL
LIBRARY

There were many negroes there, black folk just like him, but they had come from entirely different places. Sambo got for a master a certain Judge Jackson, an irritable man with a big red moustache. From morning till night Sambo cleaned boots, took

care of the little white master who pulled his hair, and went to the market for the fat, pompous cook.

One day the wife of the master called Sambo to her and said to him:

"Sambo, take this to Mr. Jackson." She gave him a basket and a little piece of white paper.

On the way Sambo couldn't keep from peeping into the basket to see what made that appetizing

smell. In it were several roast chickens. There were so many. How could the judge eat them all? It wouldn't make any difference if there were one less. Sambo sat down on the ground and ate one up.

Singing a cheerful tune he went on to the courthouse. The judge glanced at the paper and then looked into the basket. He looked at the paper again and then said:

"But where's the other chicken? There are only three there. Where's the fourth?"

Sambo was taken by surprise. Had that cursed paper seen him? Can paper talk?

He caught it for eating the chicken. So when they sent him the next time to take the master's dinner to him he resolved to be more careful. Before he began to eat he hid the paper under a stone. Let it lie there under the stone! It couldn't see anything from there. When the chicken was finished, Sambo took out the paper and went on, feeling fine.

But the cursed paper was evidently possessed of some devil. For even when it was lying under the stone it had managed somehow to see everything and told the judge all about Sambo's little escapade! Everybody scolded him: the master, his mistress, and even the fat, pompous cook. The only one who didn't scold him was his little master. He rode about on Sambo's broad back with as great glee as ever.

But it took people a long time to think up talking paper. They thought up talking *things* much earlier. A pipe spoke to them of peace, a spear talked of war, a drawn bow meant an attack. Many thousands of years went by before they progressed from talking things to talking paper.

CHAPTER IV

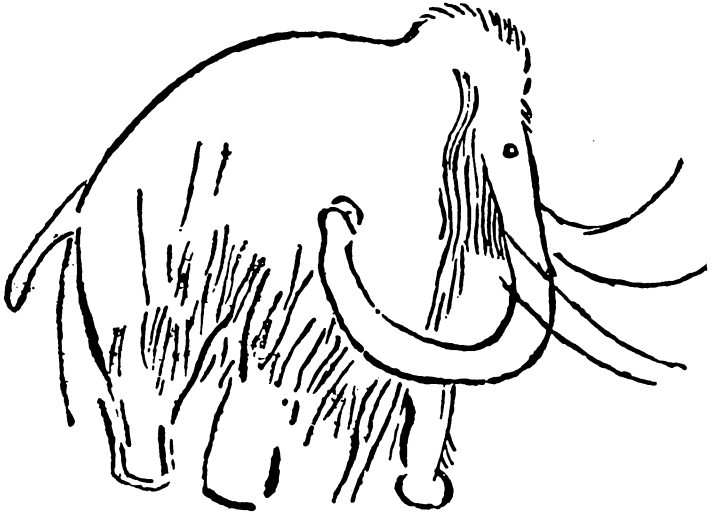
A Picture Letter

It is easy to write a letter if you have paper and pencil. But if you didn't have either the one or the other, and if in place of the twenty-six letters of the alphabet you had a heap of all kinds of things such as arrows and pipes, it wouldn't be so easy. Suppose you want to inform some one that during a hunt a tiger killed three men. How would you do it?

Among the things that you have at hand you haven't got a living tiger and certainly you haven't any human corpses. And even if you had them it would be somewhat difficult to send such an unusual letter. But if you can't send an actual live tiger it isn't so hard to send a picture of one. So people began to send picture letters instead of parcel letters. For people learned to draw very early. At a time when hairy mammoths and arctic reindeer were still wandering about in the spots where now stand

the cities of Paris and London, when people were still living in caves, they carved all kinds of pictures on the bones of the wild animals which they had killed. Beside these drawings in caves, drawings which were probably made as a magic rite, we have other drawings which we can call picture letters which have come down to us from those ancient times. Some of them are carved on flat bones, others on the bark of trees, and others are painted on the skins of reindeer.

Now, in place of sending a pipe, they sent a picture of a pipe; in place of a bow, a picture of a bow.



In this way they could represent lots of things, but by no means everything. How would you draw the wind, for instance, or life, or bravery, or happiness?

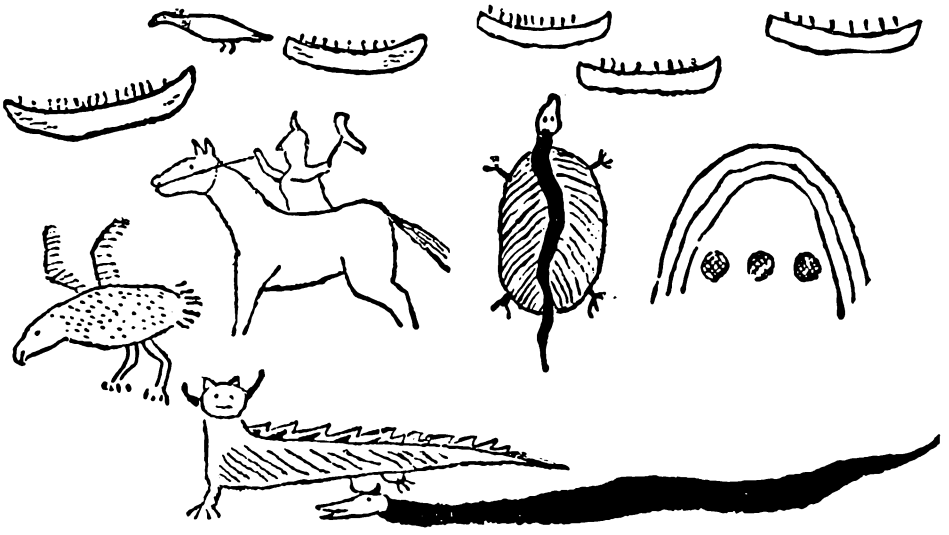
If we examine these old letters we shall see that people got out of this difficulty very cleverly. They represented the wind by an inflated sail. Life was represented by a snake, because there was a belief that snakes live forever. Bravery was represented by a lion or an eagle. If the Indians wanted to express the idea that a man was happy they made a picture of a turtle right beside a picture of a man, for they thought that the turtle brought good luck. Superstitious people in our times would draw a horseshoe for this purpose.

On the following page is a picture letter which was found on a cliff near Lake Superior in America. It is not hard to read it. The five long canoes, in which there are fifty-one men, represent the Indians going across the lake. The man on a horse is evidently their chief. The invasion must have lasted three days for there are three suns, under three arches, representing the sky. The turtle and the eagle mean that the invasion ended successfully, thanks to the bravery of the Indians. The strange animal, which some people think represented a panther, is the name of the chief. They called him Pan-

ther. The snake at the bottom must mean that no one was killed during the attack, that all came back alive.

You see how we translate a picture letter into words.

A certain old English writer tells a story in his



A Picture Letter Found Near Lake Superior

book, in which a picture letter plays a very important rôle. I shall tell you this story in a shortened form.

The Story of the Lost Expedition

"It was in the year 1837," began the Captain. "I was still a very young fellow. I was travelling on the Mississippi on the steamer *George Washington,* the one which was later sunk by a boiler explosion.

"Once a party came aboard our steamer at New Orleans. It was an expedition which had been sent to explore the swamps and woods, of which there is not a trace left to-day. They were all young people, full of life. The captain was the only middle-aged, serious man among them. He didn't like to joke, but sat about and kept writing things down in a little note book. One could see at once that he was an educated man. But the rest of them loved to joke and drink, especially the soldiers who had come with the expedition as guards.

"When the company disembarked, the ship seemed silent and deserted. At first we often talked of them, but gradually we forgot about them. Three or four months went by, I don't know exactly how many. I was working on another steamboat, the *Medusa*. One day a passenger came up to me, a grey-headed old man, and asked me:

" 'Are you George Kipps?'

" 'Yes, sir, I am,' said I.

" 'I've heard that you used to be on the *George Washington?*'

" 'Yessir, I was,' said I, 'but why are you interested in that?'

" 'Well,' said he, 'this is why. My son, Tom, went out with a company of explorers on that ship. He and the whole company were lost. No trace of

them has ever been found. Now I am going to hunt for them myself. Maybe he is lying sick somewhere.'

"I looked at the old man. I felt sorry for him. If he went into those woods he was in danger of getting the fever and of being shot by Indians.

" 'What, are you going to hunt for him alone?' I asked him.

" 'No,' he said, 'I have to have some one with me. Can't you tell me of some one who would be willing to go with me? I would pay him well—I will sell my farm if it is necessary.'

"I thought a while and then said:

" 'If I'll do, it's a go!'

"Next day we went ashore. We provided ourselves with provisions, bought pistols, rifles, tents, hired an Indian guide, made inquiries among the neighbouring settlers and started off.

"It's hard to say how many miles we walked. I'm a strong man but I was just about worn out. The country was wet and swampy. I began to persuade the old man to go back. 'It looks as if we're on the wrong track,' I said. 'If the expedition had gone along here there would have been some trace left of them. But see how many days we have been travelling and we haven't seen a sign of any camp fire.' The guide agreed with me. The old man was

just on the point of giving up but he changed his mind on account of, what do you think? A simple brass button. And this button brought the old man to his grave.

"We had stopped in a little glade to rest. The Indian guide and I had made a camp fire and begun to put up the tent. The old man was sitting on a stump. Suddenly he cried out:

" 'John, look, a button!'

"I looked, and sure enough there was a button such as the soldiers wore in those days. The old man was crazy with excitement. He would look at the button and cry. He kept saying:

" 'This is my Tom's button. He had buttons just like that. Now we shall find him!'

"I said to him, 'But why do you think that Tom lost this button? There were eight soldiers.'

" 'No,' said the old man. 'Don't argue with me. The minute I saw this button I recognised it.'

"We went on for three days more. Now the old man wouldn't go back for anything. And I stopped trying to persuade him to go back. A button was at any rate a clue.

"Next day the old man fell sick with fever. He was burning up with fever, and shaking with chills, but he didn't want to lie down.

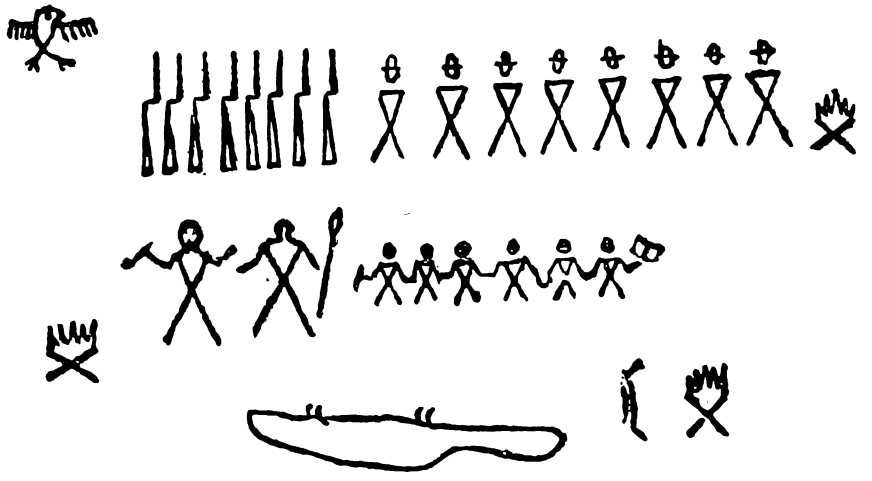
" 'We must hurry,' he said. 'Tom is waiting for me.'

"Finally he couldn't hold out any longer, and became unconscious. I took care of him for two or three days as if he had been my father—I had grown attached to the old man. But nothing did any good. He died, still clutching that button in his hand. We buried him there, and went back, but by another way. And now, as if in spite, we did find real traces. At first we found traces of the camp fires. Further on a little flag. And then, most interesting of all, a bit of bark. I have kept it all these years."

The captain brought out a little box with the picture of a three-masted ship on its cover. He opened it and pulled out a bit of birch bark on which was drawn the picture which you see on the following page.

"One of the Indians of the party had drawn this picture. Apparently the party got off the roads and wandered about in the woods for a long time. The guides, according to the custom of their tribes, left this birch bark letter in the woods to tell what had become of them. The letter was fastened to a tree in the forest in a very prominent place. My Indian guide explained to me what the letter meant. There were eight men and alongside of them were eight

guns. These were eight soldiers, of whom Tom was one. The six little figures were those who took part in the expedition. The man with the spear and the man with the pipe were the Indian guides. The camp fires indicated the places where they had camped. The beaver lying with his legs in the air



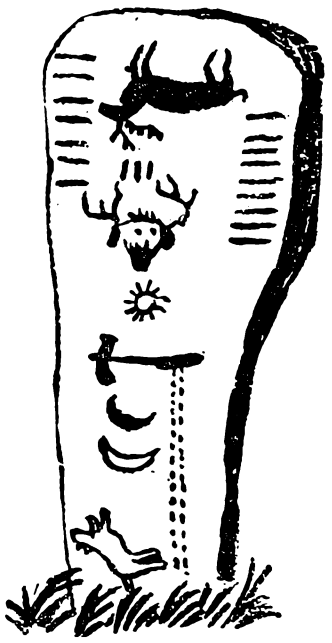
An Indian Message Written on Birchbark

meant that one of the Indians, named Beaver, had died on the way.

"When we found this letter I determined to renew the search for the party. We went on further along the road and within a week found the party which had lost their way.

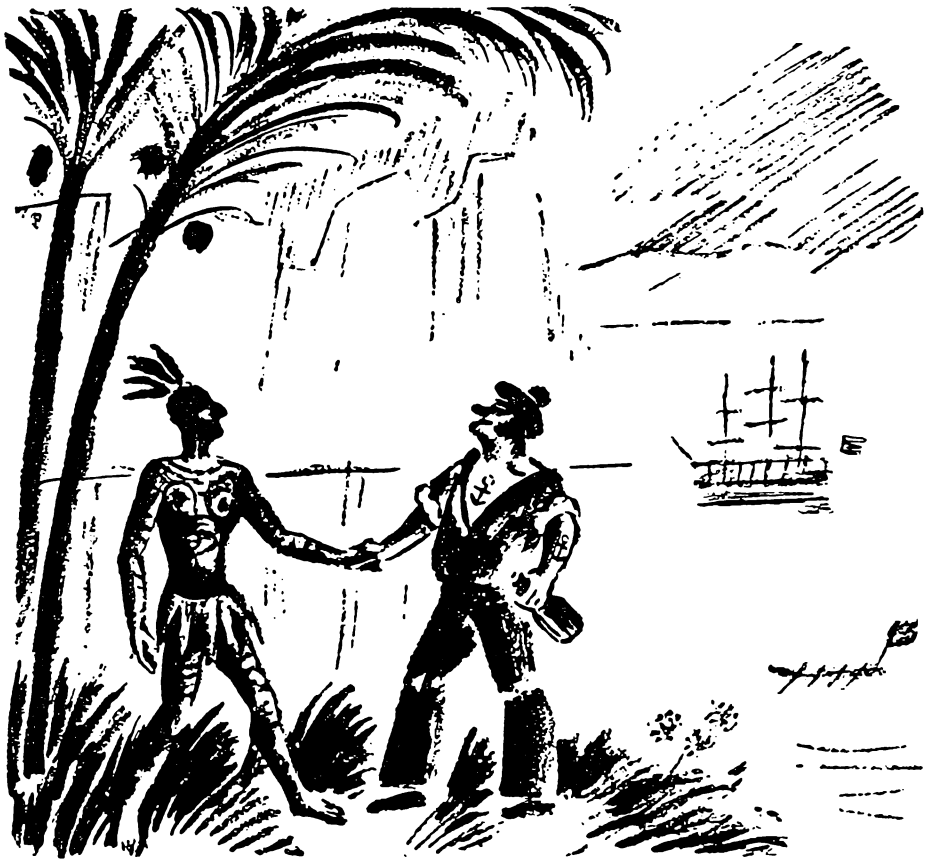
"Many years have passed since then, but every time I see this bit of bark I remember the old man and his button."

On the bit of bark which the captain showed to the author of this story there was a picture of a beaver with his legs in the air. On the tombs of Indians there are often found pictures representing animals for whom either the person buried there or his tribe was named. Here, for instance, is a stone on which there is a drawing of a reindeer. From the pictures carved on this stone you can learn the whole history of the man buried under it. His name was evidently Swiftfooted Reindeer or something like that. He was a famous hunter of elks. The elk's head drawn below the reindeer shows this. He took part in many invasions and battles. The marks indicate how many. The last war in which he fought lasted two months—this is the meaning of the two moons and the tomahawk. He was killed in this war. The reindeer with its legs in the air, drawn under the two moons, shows this. The picture of the sun shows that this happened in the daytime.



An Indian Tombstone

The whole biography of a savage can often be read on his own body. It is the custom of many tribes to decorate their bodies with pictures. They begin



Tattooing

in childhood to draw pictures on themselves and by the time they are old men they look more like a crazy quilt than a human being.

This is the way they do it. They press a sharp little comb against the body, and, indifferent to the

pain, they hammer it into the skin. Then they put soot or paint into the holes.

Among the savages who inhabit the Polynesian Islands every design used in their tattooing has a meaning. The terrible face on their chests is the head of a god. Only a chief has the right to this symbol. A design made up of lines and squares indicates the expeditions in which the warrior has taken part. A design of white bows and black whorls is a record of the victories which the warrior has had over his enemies.

The habit of drawing pictures on one's own body seems ridiculous to us. But even among white people, who consider themselves civilized and educated, there are many people who decorate themselves just as the Polynesians do. It is true they don't draw pictures on their bodies, but they put signs on themselves, such as golden epaulettes, ribbons over their shoulders, stars, medals, and helmets decorated with feathers and eagles. All these decorations tell of their offices, titles, and military services just like the pictures on the savage's body.

CHAPTER V

Puzzle Writing

LEARNED men spent many years trying to decipher the puzzle of the mysterious designs which covered the walls of ancient Egyptian temples and pyramids. Some of them were easy to understand. These were representations of people engaged in all kinds of different occupations. There were scribes with scrolls in their hands and reed pens behind their ears; merchants selling necklaces and perfumes, oil cakes and fish. There were glass blowers blowing glass cups; jewellers making golden bracelets and rings; warriors with leather-covered shields running in regular formation in front of the chariot of the Pharaoh. When you see these pictures you can easily picture to yourself how an Egyptian workshop looked, how trading was done in the market places, and what a royal procession was like.

But these drawings, which any one can under-

The Carving on an Egyptian Monument

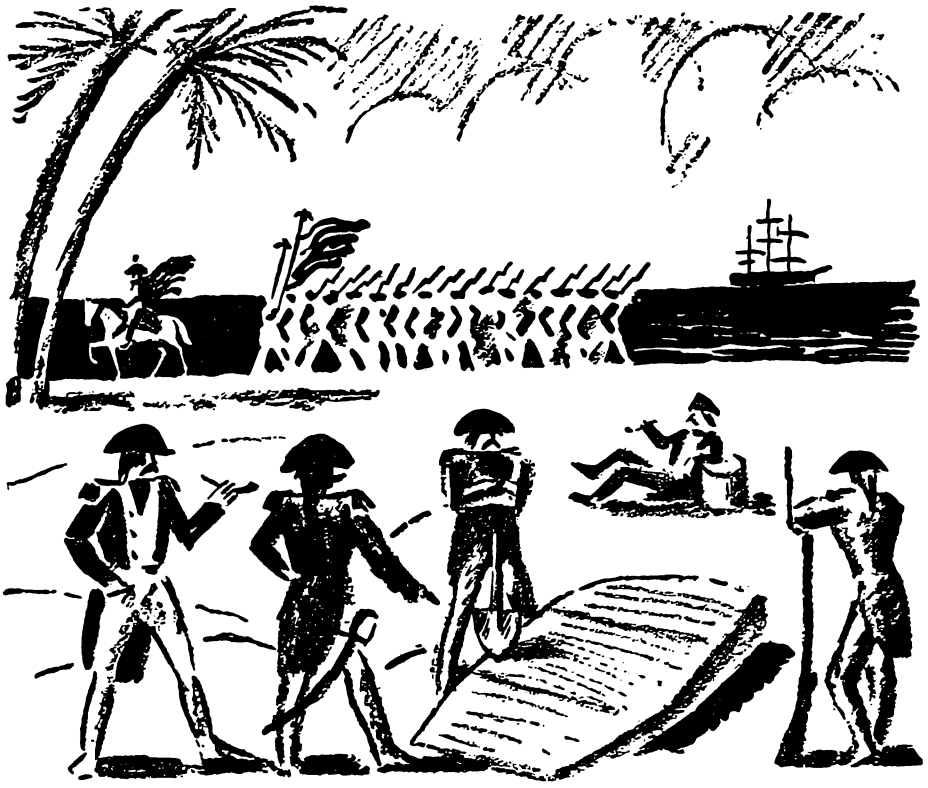
stand, representing the lives of people who lived several thousand years ago, are surrounded by many other drawings and symbols whose meanings are not at all clear.

On these Egyptian monuments there are carvings of snakes, owls, hawks, geese, lions with birds' heads, lotus flowers, hands, heads, people sitting on their haunches, and people with their hands raised up over their heads, beetles, palm leaves. They are drawn in long lines like letters in a book. Among these pictures we find, too, innumerable geometrical designs of every possible description, squares, triangles, circles, loops. It is impossible to enumerate them all.

Behind these mysterious symbols, "hieroglyphics," were hidden centuries of history of the Egyptian people, their customs and ways. But no matter how hard scholars worked to figure out the meanings of the hieroglyphics they couldn't do it. The descendants of the Egyptians, the Copts, were of no assistance because they had long ago forgotten the writing of their forefathers. But at last the secret of the hieroglyphics was discovered.

In the year 1799 some French soldiers, under the command of General Napoleon Bonaparte, disembarked on the coast of Egypt. As they were digging trenches in the neighbourhood of the city of Rosetti

the soldiers excavated a huge flat stone with an inscription on it in two languages, Greek and Egyptian. How delighted scholars were with this find!



Finding the Key to the Hieroglyphics

Now they had a key to the hieroglyphics. It seemed that all they had to do was to compare the Greek and Egyptian writing and the secret would be discovered. But a disappointment was in store for them.

They thought that this was picture writing. That each word was represented by a different picture.

But when they tried to substitute a Greek word for every picture it didn't work out.

Twenty-five years went by. We should still, perhaps, have been unable to read these hieroglyphics but for the work of the French scholar, Champollion. Champollion noticed that some of the Egyptian symbols were surrounded with a little frame. In the Greek inscription in this place—in a frame—stood the name of the Pharaoh Ptolemy.

It occurred to Champollion that the word in the frame meant Ptolemy (Ptolmees). If so, these symbols stood for letters.

Here you can see the meaning of these letters.

П Т О Λ М Е Е С

P T O L M E E S

But this was only a guess. Perhaps the symbols really meant something entirely different. He must find some way of checking it. Fortune favoured him. On the island of Phile they found an obelisk which also had its inscription in two languages. In this inscription some kind of word in a frame occurred very frequently. Champollion immediately recog-

nised in this word some letters which he knew. He substituted these letters and got

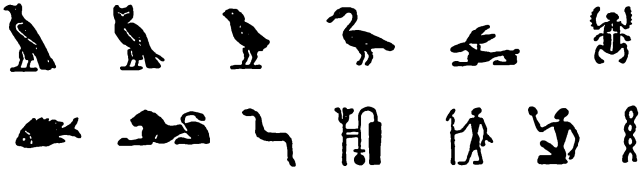
When he compared the Greek text Champollion was delighted to find in that place the word KLEOPATRA. That meant that his guess was right. The symbols in the oval frames didn't stand for words but for separate letters. And now Champollion had eleven such letters: p,t,o,l,m,e,s,k,a,t,r.

But when Champollion tried with the help of these letters to decipher the words which were not enclosed in frames, he didn't have any success. Many years went by before the reason for this became clear. The fact was that it was names, only, that the Egyptians wrote with letters. Other words were written in all kinds of ways. Egyptian writing reminds one of a rebus; some symbols mean whole words, others separate syllables, and others only letters. See this rebus, for example, in the Egyptian style:

Here some of the pictures stand for letters: an eye stands for I, a harp for H, an angle for A, a vase for V, an eagle for E. Another picture represents a syllable: *can*. Or a picture may stand for a whole word: *book*. Notice how the word *I* is represented. There is a picture of a human eye. But this picture doesn't mean *eye* but *I*.

The Egyptians often used this method to represent a word which it was impossible to represent in any other way. Take the word for *beetle* for instance. The Egyptian spelling for this is *HPR* (the Egyptians never wrote vowels). But the verb *to be* is also *hpr*. So whenever they had to write the word "be" they drew a picture of a beetle.

Here are samples of some Egyptian hieroglyphics.



There was a time when the Egyptians, like the Indians, wrote by means of pictures. But this was very long ago. Little by little some of the pictures began to stand for syllables and finally for letters. It

is from these letters of theirs that we have got our letters. In the course of several thousand years the Egyptian hieroglyphics have migrated from the banks of the Nile to the plains of Russia.

The story of how the writing of the ancient Persians was deciphered is even more interesting than the story of the hieroglyphics. The Persians, like their neighbours the Babylonians, wrote their letters on clay tablets with a little stick. The strokes were wedged-shaped, cuneiform. From this the writing is called cuneiform writing.

Scholars spent many years trying to decipher this cuneiform writing. They had given up all hope of getting at the meaning of these strange, unique wedges, when a clue was discovered. It was a German scholar, Grotefend, who deciphered this writing. His problem was an especially difficult one because he didn't have any inscriptions written in two languages.

While studying the monuments of Persian kings he noticed that certain words were frequently repeated on all the monuments. Grotefend guessed that these words meant "king of the Persians" or something like that. Then the word which stood before the word "king" might be the name of the king: for example, "Kir, king of the Persians."

On one of the monuments this word was represented by seven cuneiform symbols. Grotefend

Cuneiform Writing

thought over all the names of the Persian kings: Kir, Darius, Xerxes, Artaxerxes—and tried to substitute them in place of the cuneiform letters. The name of Darius, or as it was written in ancient

Persian, "Darivush," fitted the number of letters in this word.

D A R I V U SH

Now Grotefend had seven letters at his disposal. In another he noticed the letters that he knew:

SH I A R SH A

Only the first letter was missing. It wasn't hard to guess that this letter was K and that this word stood for KSHIARSHA, that is Xerxes.

The key was found. And the strange thing is that it was the name of a king which supplied the key to both Champollion and Grotefend.

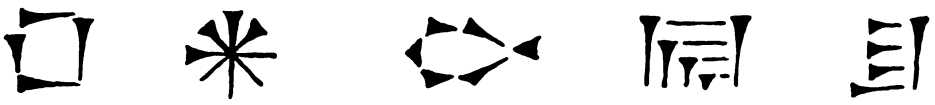
Finally Grotefend figured out the other letters too. It turned out, just as he had surmised at the beginning, that on all the monuments, right after the name of the king, stood his title, for example:

Darius, the great king, king of kings, rules over the Persians, king of the people.

And so the Persian writing was deciphered.

We must mention that the Persians did not invent the cuneiform style of writing, but took it from

the Babylonians. The Babylonians, like all ancient people, at first drew instead of writing. In place of a circle, for instance, they made a square. As time went by, these designs began to stand for only the first syllable of a word instead of for the whole word.



The Persians still further simplified the cuneiform writing and made each sign stand for a letter.

These mysterious letters waited for thousands of years for some one to come along and decipher their meanings. How much that is new and interesting people have learned since Champollion and Grotefend penetrated the secrets of hieroglyphics and cuneiform writing!

But not all the riddles are solved. No one has ever succeeded in reading the letters which are inscribed on the lions and sphinxes which are found in Syria and Asia Minor, the country where once was the mysterious government of the Hittites. All we know of these people is what the Egyptians tell us about them. Only when we are able to read their writing shall we know about the past of this forgotten race.

But the reading of the letters is not all. If Champollion had not known the language of the Copts

(the Copts are the descendants of the Ancient Egyptians and from their language we can form an idea of that of the ancient Egyptians), he could not have understood the Egyptian inscriptions.

We are still worse off when it comes to deciphering the writing of the Etruscans, the ancient inhabitants of Italy. Their letters closely resemble those of the Greeks, so that it is not hard to make out the words of their inscriptions. But no one knows the language of the Etruscans. Therefore the meaning of these inscriptions has not yet been discovered.

What a pity it is—to have in our hands these

ancient writings, and even to be able to read them, and yet not understand a thing they say. How many interesting riddles are still to be unravelled! How many discoveries will be made during the lifetime of each one of us!

CHAPTER VI

The Migrations of Letters

PICTURE writing gradually changed into writing by means of letters. But in some places, even in our time, hieroglyphics are still in use. The Chinese, for example, still write with hieroglyphics, even though they began to use them for writing long before we did. Paper, powder, porcelain, and printing were all known in China long before they were even heard of in Europe.

And even with us, hieroglyphics have not gone entirely out of use. A hand, which points out the way with its finger, or an arrow, red zigzags of lighting on a pole which carries electric wires, a skull

and cross bones on a bottle containing poison, these are all hieroglyphics representing words or whole sentences: "Go this way!" "Look out for the current!" "This is poison!"

In certain cases hieroglyphics are more practical than letters. They are absolutely necessary to the Chinese. They not only do not want to substitute letters for their hieroglyphics, it is impossible for them to do it.

For the Chinese language is a very strange one. It has very few words. And all the words are very short, one-syllabled ones. Every word has many different meanings. This is occasionally true nowadays, too. The word *fast* has two meanings: we say, "it rolls *fast,*" but also, "it is stuck *fast.*"

But with the Chinese every word has several meanings. How can this be represented in writing? At first this seemed impossible, but the Chinese thought up a way out of the difficulty. Take the word "choo" for instance. This word means: *ship, garrulity, conflagration, a basin,* and *down.* This word is represented in writing by the drawing of a sail on a mast. This means *ship.* To make it mean *garrulity* they make a picture of a mouth at the right. For *conflagration* they add the picture which stands for *fire. Sail* plus *water* means *basin. Sail* plus a *feather* means *down.*

The Chinese have greatly simplified their hieroglyphics to make it easier to write them. In the black strokes, joined together in every possible manner, helter-skelter, apparently, it is hard to recognise the pictures of people, horses, stars, suns, moons. But it is still harder to recognise the pictures in our letters.

Ship

Garrulity

Conflagration

Basin

Down

Would you believe that every one of our letters was originally a picture of some actual object? Like hunters, keen on the trail of their prey, scholars have step by step traced out the long road our letters have travelled, as they changed from these original pictures to letters. They went from country to country before they finally reached us. Their native land was Egypt. The Egyptians were able to express their thoughts by means of pictures long, long ago. But there came a time when they realised that you can't express everything by means of pictures. How, for example, are you going to draw names? It's easy enough if the name is like something—then all you

have to do is to draw this thing. The Indians did this: to write the name "Big Beaver" they made the picture of a beaver. Americans, for instance, could in this same way represent the name *Woodbury* by a rebus: first a row of trees representing a forest (*wood*), then a picture of a berry.

But what shall we do if the name is not like anything else? How would you represent the name Peter, for instance, or John? Here, little by little, they began to make use of letters. And it was this that made the Egyptians add twenty-five real letters to the hundreds of hieroglyphics which meant whole words or syllables. They did this very simply. There were

many short words in their language, such as "ro"—mouth. The picture which represented *mouth* began to be used to mean not only *mouth* but also the first letter of this word *r,* etc. So several hieroglyphics came to be used as letters.

But side by side with the new way of writing the Egyptians kept also the old way. They would often write a word with letters and right beside it draw the picture which stood for the word. It is evident that they didn't entirely adapt themselves to the use of letters at once. For example, they wrote out with letters the word *TN* which meant *book,* and right beside it drew the picture of a book. Or they wrote the word *AN,* which meant fish, but put a picture of a fish alongside it.

It wasn't only because it was hard for them to get used to letters that they did this. There was another reason for it, too. In the Egyptian language, just as in the Chinese, there are many words which are written identically. To avoid confusing them every word had to have a key, a sign to show which word it was. These pictures of book and fish served as such keys. Without these signs there might have been a lot of misunderstanding, because the Egyptians had thought up only letters representing consonants—they had not thought up any to represent the vowel sounds. For example, they wrote *hpr*

(beetle) instead of *heper*. If we wrote our words without using any vowels we should have to make use of keys, too.

The word *fll* for instance, without any vowels, might be read in four different ways: *fall, fell, fill,* and *full*. This explains why the Egyptians had to use these key pictures.

You would think that the person who thought up using letters would have thought up the whole idea of an alphabet. But this was not the case. The Egyptians, while making use of letters, still did not invent the alphabet. In their papyrus books, and on the stone walls of their temples, we find side by side hieroglyphics of every description, some standing for whole words, some for syllables and some for actual letters.

It was not the Egyptians who invented the alphabet but their enemies, the Semites. About 4,000 years ago Egypt was conquered by a Semitic tribe of Hiks, who poured into the valley of the Nile from the east, from Arabia. For a hundred years the kings of the Hiks ruled over Egypt. They learned writing from the Egyptians and added a very valuable discovery: that all words may be written with letters. For their alphabet, the first alphabet in the world, they took only about twenty of all the Egyptian

picture hieroglyphics. They changed these pictures into letters in the most simple way.

We have all seen the alphabet illustrated by pictures in primers and first readers. We all learned to read in books with pictures where there was a picture of an *Axe* beside A, of a *Bee* beside B, and so on. We are all familiar with such primers. But none of us ever thought of representing the syllable *AB* by a picture of an Axe and a picture of a Bee. But that's just what the Hiks did. For the sound A they began to draw the picture of an ox's head, because in their language the word for ox was *Aleph*. For B—a house, which in their language was *Bet*. For R a man's head, which in their language was *Resh,* so they got a collection of twenty-one letters. But they took the drawings from the Egyptian hieroglyphics. There they found as many heads, houses, oxen, and everything as they needed. So the first alphabet originated in the calendars of the Hiks.

A hundred years went by. The Egyptians threw off their "foreign rulers," as they called the Hiks. The government of the Hiks disappeared from the face of the earth. But their alphabet passed over to the countries which lay along the coasts of the Mediterranean Sea, eastwards from Egypt. The Semitic

tribes who lived here—sea-faring Phœnicians, agriculturists and shepherds—Jews—preserved the writing of their kinsmen the Hiks.

The Phœnicians were travellers and traders. Their ships were to be seen along the coasts of Greece, at the island of Cyprus, and even as far as the Straits of Gibraltar. When they arrived at a new country they would display their wares, valuable necklaces, swords, hatchets, glass cups, and exchange them for hides, homespun cloth, slaves. Along with their merchandise they carried the alphabet all over the world too. The people who traded with the Phœnicians adopted their alphabet also. These were not the letters which had come from Egypt. The Phœnician traders didn't have time to draw all these pictures. They changed the oxen, snakes, heads, and houses into signs that could be written quickly.

The letters crossed the sea to Greece, and from there went west to Italy and north to us. But they didn't set out on their travels immediately after leaving Phœnicia. They rested for some two thousand years in Greece before they started on their journey to the north. And during this time they changed still more.

It has taken four thousand years for the Egyptian letters to make their long journey through Phœ-

nicia, Greece, and Rome to us. All kinds of things happened to them on the way. They changed their forms, they turned round now to the right, now to the left, they lay on their backs and stood on their heads. They travelled on the thirteen-banked ships of the Phœnicians, on the backs of slaves, in round baskets made for carrying rolls of papyrus, and in the knapsacks of wandering monks. Many of them were lost on the way. But new companions joined them from time to time too. Finally, after long wanderings, the letters reached us so changed as to be almost unrecognisable.

To find their original features we have to put them side by side and compare the Egyptian hieroglyphics, the writing of the Hiks, found in the temple of the goddess Hator on the peninsula of Sinia, with the Phœnician, Grecian, Slavonian, and finally the Russian letters.

If you look at these rows of letters (page 63) you will see how the horned head of an ox was changed into our A (you can see the resemblance of this letter to an ox's head, only with the horns at the bottom).

You will also notice that all the letters formerly faced in the opposite direction from the way they face now. This was because the ancient Phœnicians did not write from left to right as we do, but from

	Egyptian	Hyksos	Phœnician	Old Greek	Greek of the time of St. Cyril	Slav	English
Ox							A
House							B
Corner							G
Door							D
Man shouting "Hey"							E
Olive twig							Z
Palm branch							K
Rope							L
Water							M
Snake							N
Eye							O
Mouth							P
Head							R
Mountain							S
Cross							T

right to left. The Greeks, when they got the alphabet from the Phœnicians, also wrote to the left at first. Afterwards they began to write in both directions, one line left to right, the next right to left, etc. But they found that this was not practical and finally got round to writing all the lines from left to right. And we learned from them to write in this way.

When the Greeks changed the direction of the writing they turned the letters round to face in the opposite direction, too. That is, the letters manœuvred about over the page like a railway train before they finally got started in the right direction.

But why did it seem more convenient to write from left to right instead of in the opposite direction? What difference does it make, really, whether we write from left to right, from right to left, or from top downwards, as the Chinese do?

Well, it does make a difference. There was a time when the Egyptians, from whom we got our letters, wrote from top down as the Chinese do. In doing this the scribe held the roll of papyrus in his left hand and wrote, as he should, with his right. He had to begin at the right hand, otherwise his hand would have been in his way. If you write the title of this book in this way you will get this:

But this was not entirely convenient. The scribe, as he went from the first line to the second, blurred the fresh ink of the first line with his hand as he was writing the second line. This doesn't trouble the Chinese because they write with an Indian ink which dries very quickly. But the Egyptian ink, which was made of soot, vegetable glue, and water, dried very slowly. To get out of this difficulty they began to write across the page instead of up and down. Then the right hand, as it wrote, moved along the clean white page and didn't smear the fresh ink of the previous line. But the old habit of writing from right to left persisted.

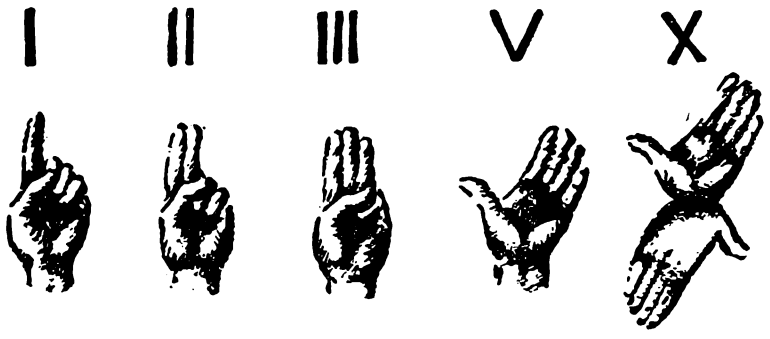
They continued to write in this way until the Greeks began to write in both directions.

Finally, of the two ways, that of writing from left to right won out among European peoples. But the Hebrews and many other people still write from right to left.

We have followed the wanderings of the letters from Egypt to Russia. But this is only one of the journeys which the Egyptian hieroglyphics have made over the whole world. The letters went from Greece not only to the north but also to the west, to

Italy, where they became the Latin alphabet. As they flew out from Egypt over the whole earth the letters penetrated into India, into Siam, into Persia, into Armenia, Georgia, Tibet, and Corea. There is no alphabet in the world which did not come from the Egyptian alphabet.

The history of our figures is even more astonishing than that of our letters. Did you know that the



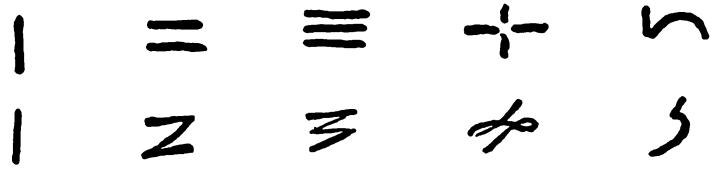
figures which we use are also hieroglyphics, picture-letters?

There was a time when people could only count on their fingers. If they wanted to say "one" they held up one finger; for "two," two fingers, etc. All the five fingers of one hand meant "five" and both hands meant "ten." When they had to express a larger number they waved their hands like a windmill. At first sight you might think that a person counting in this way was trying to fight off mos-

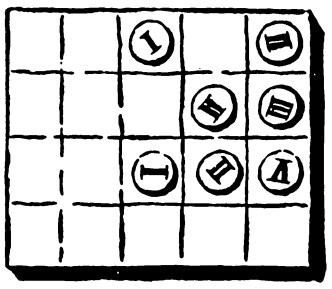
quitoes. This way of counting with the fingers or hands is the one that is used on paper too. If you look at the Roman numerals you will at once guess that I, II, III are one, two, and three fingers. V is the hand with the thumb held out at an angle, and X is the two hands so held.

But not the Roman numerals only were derived in this way. The figures which we use now were also taken from the fingers. At first they wrote these figures in this way: *one* was represented just as it still is; *two* by two little marks, not standing up but lying down; *three,* by three little sticks, also lying one above the other; *four* by sticks arranged in the form of a cross, and *five* by a hand, or fist with extended thumb.

As in case of the letters the figures became changed when they were written fast. When they were written without taking the pen from the paper they took on the following forms.

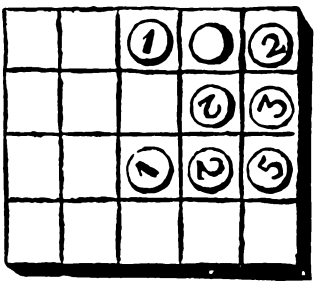


From this it was not far to our figures: 1 2 3 4 5. The other figures were obtained by combining the first five. But the story of *zero* is the most interesting of all. What is zero? Nothing. An empty place. It took people a long time to think up how to represent it. The invention of *zero* is as big a job as the invention of a steamboat or telephone.

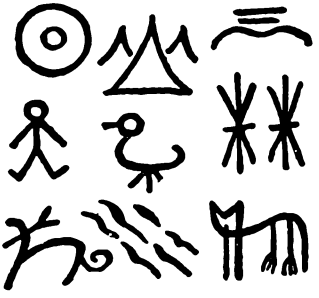


At first there was no zero at all. For reckoning they used a board marked off in squares and circles on which the figures were written. If, for instance, you wanted to add 102 and 23 you arranged the circles on the board in this way: That is, they just left the zero place blank. This board was called an "Abacus." An abacus was very good for the method of representing numbers which were used by the Greeks, that is, using the first letter of the alphabet for 1, the second for 2, and so on. Without the use of such an abacus it would have been

very hard to reckon in this way. For example, how would they add Lambda and Pi, or Nu and Ro? The Greeks reckoned in their minds, merely writing down the results.



Very soon they began to use a regular table in place of the abacus. There were no squares marked out on this table. So to indicate an empty square they began to use a circle with no mark on it; like this ① ◯ ②. When they began to write these symbols down on paper the empty circle was drawn on the paper and became our *zero*.



PART TWO

CHAPTER I

Everlasting Books

THE letters, as they journeyed from land to land and from nation to nation, were at the same time making another journey. From stone they went to papyrus, from papyrus to a wax tablet, from a wax tablet to pergament, from pergament to paper. Just as a tree grows differently in a sandy soil from the way it grows in a boggy or clayey one, so the letters, as they passed from one material to another, changed their appearance: on stone they grew stiff and straight; on paper they grew round, on wax they bent over like commas, on clay they took the forms of wedges, little stars, and angles. But even when they remained on the same material, as on pergament or on paper, they did not keep to one form but kept constantly changing in the most capricious fashion.

Here you have a few lines, written at different

times and on different materials. You see there the stern, stiff features of the letters which are cut in stone; the curves which are made in wax; the round, legible letters written on pergament. At first glance

Letters Cut in Stone, Wax, and Written on Pergament

it seems as if these lines are written in different alphabets. But all three of them are written in Latin letters, only not on the same material, and with different implements.

How many ways there were of writing! Pencil and paper, to which we are so accustomed, are very recent inventions. Some five hundred years ago a school boy's book bag had neither pencil, steel pen,

nor note book. They wrote with little sharp sticks on a tablet covered with wax, holding it on the knee. It cannot be said that this was a very convenient way of writing.

But if we go still farther back, to the time when writing was just beginning to develop from the drawings of the cave dwellers, we shall see that it was unbelievably hard to write at that time. There were no special writing materials at all. Every person had to devise his own way of doing it. People made note books of anything that fell into their hands: the shoulder blades of sheep, leaves of the palm tree, broken pieces of pottery, skin of wild animals, bits of bark—they used any and everything that could be used—anything on which crude drawings could be traced with a bit of sharpened bone or stone.

Many of these ways of writing lasted for a long time. They say that Mahomet wrote the Koran on pieces of sheep's shoulder blades. In their public assemblies the Greeks used to write their votes on bits of broken pottery—"ostraki"—instead of on bits of paper as we do. Even after papyrus paper was invented many writers were compelled by poverty to

write on bits of pottery. They tell a story of a certain scholar who broke up all his pots and kettles so that he could write a book on the pieces. And once some Roman soldiers and officials serving in Egypt were short of papyrus and so wrote their accounts and receipts on bits of broken pottery.

But palm leaves and bark of trees were much better writing materials. People wrote on these, with a

needle, up to the time that papyrus appeared. In India whole books were made of palm leaves. The edges were evened up, the leaves cut into shape and sewed together with thread. They gilded or decorated the edges so that they produced a very beautiful book, though it was more like a window shutter than a book.

These bone, clay, and palm leaf books are now to be found only in museums. But there is one old way of writing which we still use—that is, writing on stone. A stone book is the longest lived of all books.

A Stone Book

Whole stories, cut on the walls of Egyptian tombs and temples four thousand years ago, have come down to us. We, also, carve on stone tablets anything which we wish to preserve for a very long

An Agreement on Bronze

time. The reason we write on stone so little is that, in the first place, it is hard to cut the letters in the hard stone, and in the second place, such a book, weighing several hundred pounds, is so heavy that a man cannot move it, but it has to be handled with a crane. You would never be able to take a stone

book home to read, and you could never send a stone letter through the mail.

People were always trying to discover some material which was lighter than stone but equally durable. They tried writing on bronze. We can still see bronze tablets with inscriptions on them, once used to decorate palaces and temples. Sometimes, one such tablet took up a whole wall. When they wrote on both sides of the bronze plate they would suspend it by chains from the ceiling.

See the bronze church doors in the last picture. They are something like a book, too. An agreement which Count Etlein made with the inhabitants of the city of Blois is engraved on them. The townspeople agree to make a wall around the count's castle and in return are to have a right to use the duties which are collected on wine. This wine is long since drunk up, the people who drank it are resting in their graves, the walls around the castle have fallen to pieces, but the agreement still adorns the panels of the bronze doors.

Stone and bronze books were heavy and unwieldy. But this was not their greatest drawback. The worst thing of all was that it was so hard to write on them. What would a writer of to-day say if he had to put on an apron, arm himself with a hammer and chisel and make himself into a stone mason? It would take

a whole day's hard hammering to produce one single page of writing.

No, our present means of writing is better. It is true that paper is not a very durable material. But is there any material which would be as durable as stone and as easy to write on as paper? The Babylonians and Assyrians, who once lived in the valley between the Tigris and Euphrates rivers, long, long ago, discovered just such a material. In Kuyundzhik among the ruins of ancient Nineveh, an Englishman unearthed the whole library of King Assurbanipal. This was a very strange library, without one single page of paper. All the books were made of clay.

This is the way these books were made: the scribe would make a tablet of clay of the proper size and thickness, and write on it with his little three cornered sharp stick. He put the stick into the clay and removed it with a quick motion which made the

letters thick at one end, with slim little tails. In this way the Babylonians and Assyrians wrote very fast, filling the whole tablet with the even little wedge-shaped letters. Then, to make the tablet durable, they gave it to the potter to be fired. To-day, potters have no connection whatever with book making. But in those times they fired books as well as pots.

These books, after they had been dried in the sun and fired in the oven, were almost as durable as stone. Such books will not burn up in a fire nor be spoiled by dampness; nor will they be eaten by mice and rats. It is true that they can be broken, but the pieces can be gathered up and fitted together. Scholars had to work a long time with the broken tablets discovered at Nineveh before they got them all put together properly.

A Book from the Nineveh Library

There were 30,000 tablets in the Nineveh library. Every book consisted of many tablets, just as our books have many leaves. It was, of course, impossible to sew the clay tablets together as we bind the leaves of a book. So all the tablets had to be numbered and the name of the book placed on every

one. A book about the creation of the world began with the words: "In the beginning that which is above was not called the sky." So, on every tablet of this book this sentence is written, followed by No. 1, No. 2, and so on to the end of the book.

Besides this the stamp of the library is in every book, as you might expect:

"The palace of Assurbanipal, king of warriors, king of the nations, king of the country of Assyria, to whom the God Nebo gave keen ears and sharp eyes so that he could find the works of the writers of my kingdom who served the kings who were my ancestors. In honor of Nebo, god of reason, I have got together these tablets, ordered copies to be made of them, and that they be marked with my name and be placed in my palace."

There are all kinds of books in this library: books about the wars of the Assyrian kings with the Lydians, Phœnicians, and Armenians; about the heroic deeds of a giant who had the legs, horns, and tail of a bull. Here is the delightful story of how the goddess Ishtar went down into the underground world to bring her husband back. There is also a story of a river which once upon a time turned the whole world into one vast, endless ocean.

At night, when the king of Assyria was troubled

with sleeplessness he would send one of his slaves to the library for books. Then he would command them to read aloud to him and as he listened to these tales the king would forget the cares which bothered him just as they did the poorest of his subjects.

The Assyrians not only wrote on clay, they also

printed on it. They made seals of precious stones, in the form of a cylinder with embossed designs. When some treaty was concluded the seal would be rolled along the clay tablet which would receive a clear impression of the design on the seal.

It is interesting to notice that this is the method still used to print patterns on woven cloth. A rotary printing machine also works in this same way: the

type is arranged on the surface of a revolving cylinder.

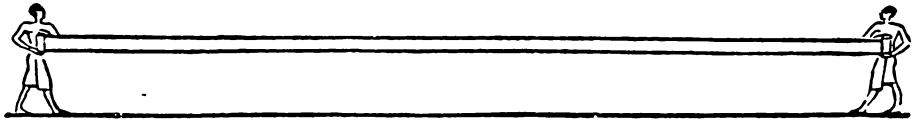
Many contracts, receipts, and accounts have come down to us which have impressions made by seals. Near the seal a signature is often found—a crook made with the finger nail. Evidently this was the way people who could not write signed their names.

CHAPTER II

Ribbon Books

BRICK books are strange enough. But the ancient Egyptians thought up an even more unusual kind of book. Imagine a long, long, long ribbon—some hundreds of yards long. It is made of a kind of paper, but a very strange kind. It looks and feels as if it were made of a lot of thin squares patched together. And if you try to tear a piece of it you will find that it really is made of such little strips, like a braided mat. In appearance this paper is yellow, smooth, shiny. It is brittle like the wax tablets.

The lines are not written the whole length of the ribbon, but in many columns. If the lines were written the whole length of the ribbon the readers



would have to run back and forth from one end to the other.

This strange paper was made from a still odder looking plant which grew along the banks of the Nile in swampy places. The Egyptians had whole fields planted with these odd looking little trees, or rather, not trees, but a kind of swamp grass which grew higher than a man's head. Its stem was bare and straight. At the top was a brush. The name of this plant was *papyrus*. This name is preserved to this day in the English word *paper,* German *papier,* French *papier,* and in the Russian *papka.*

This odd plant was a real friend of the Egyptians. They made paper of the papyrus; they ate it, they made a drink of its juice, they made clothes and shoes of it and even navigated in it. Cooked papyrus, sweet papyrus juice, cloth made of papyrus, sandals made of its bark, canoes made by weaving its stalks together—all these things the ancient Egyptians got from the ugly looking plant that looked very much like a cow's tail.

A Roman writer who witnessed the making of papyrus has left us a description of a paper factory of the ancient Egyptians. They split the papyrus stalks with a needle into thin strips, of as great width as possible. Then they pasted these strips together and got a whole page. The work was done

Gathering Papyrus

on tables kept wet with the slimy water of the Nile. This slime took the place of glue. The table was built at an angle so that the water kept flowing over it.

As soon as one row was finished they cut off the ends and laid it on top of another row, crosswise. In this way they made a kind of woven fabric in which some threads went crosswise, others lengthwise. When they had a heap of leaflets they pressed them out, put a heavy weight on top of them and put them out to dry in the sun. When they were dry they were polished with a piece of bone or shell.

There were many grades of papyrus, just as we have many grades of paper. The best grade was that made of the heart of the stalk. The Egyptians called this "sacred paper" because they used it in writing their sacred books. The Romans called this best kind of paper "Augustus paper," in honour of their Emperor Augustus. The second grade was called "Livia's paper," from the name of Augustus' wife, Livia.

There were many other grades. The poorest of all, which they called "merchant's paper" was not used for writing purposes but only for wrapping up parcels of merchandise. The best paper factories were in the Egyptian city of Alexandria. From there "Alexandrian paper" (this name is still used to-day)

went to Rome, Greece, and the countries of the East.

When the pages were ready they were glued together in long strips, with twenty pages to a strip. These strips were as long as a hundred meters or more. How could you read such a book? If you spread it out on the floor it would take up all the floor space in your apartment. And it isn't very comfortable to have to creep about on the floor to read. Shall we hang it up on a fence? But there are no special "reading fences" made. And what would happen to your book if it rained? How would you protect it from bad weather and keep hoodlums from coming along some day and tearing your whole book into bits? Or perhaps you'd get some of your friends to take hold of the ends and hold it out for you? I'm afraid that this way wouldn't do either. Where would you find any one willing to stand holding up a long strip for you for several hours a day?

Why not cut the long strip into pages and bind them into a book, as we do to-day? That sounds very simple but it wasn't thought of at once. And indeed it would not work so well with papyrus. Papyrus breaks when it is bent. It isn't like our paper which can be crumpled up as much as you like without breaking.

The Egyptians thought up a very practical way of doing this. They rolled the strip up, and, to keep it from breaking, wrapped it round a little rod. The ends of the rods were decorated with little carved figures, like chessmen. They held the rod by this end when they were reading the roll. We still roll up maps in this way and newspapers, too, are often rolled on rods to prevent their getting torn.

To read this papyrus book the carved end of the rod was held in the left hand and the right hand unrolled the book. That is, both hands were occupied when one was reading. If you let go with your right hand to scratch your eye or pick up a pen the whole roll would roll up again. It was impossible to copy out passages as you read. If you wanted to do this, two people would have to work together, one dictate and the other do the writing.

A student who likes to have a lot of books about, open at the proper places, would find it very hard to do this with these books. But this is not the only bad point of a papyrus roll. Usually one roll was only a part of the book. A book which we would print in one thick volume required several papyrus rolls of the Egyptians and Greeks and Romans. In

those days a book was not a thing which you could shove into your pocket or brief case. If you wanted to take a book with you, you had to carry a number of rolls in a round box with straps, like a big hat box, and carry it on your back. Rich people didn't carry their own books. When they went to the library or bookstore they took a slave with them to carry home the box containing the books they wanted.

A bookshop of those days looked more like a store where wallpaper is sold than a bookstore. The shelves were covered with rolls that looked like rolls of wallpaper. From each roll hung a ticket with the title of the book written on it.

They wrote on papyrus with ink, but it was a very different kind of ink from ours. They made it by mixing soot with water. To make the ink thick enough so that it would not all run off the pen onto the paper, they added gum arabic. This ink was not so durable as ours. It could easily be erased with a sponge which they used in place of rubber. Sometimes they used their tongues, when there was no sponge handy. A story is told of how at the poetical contests which used to be held at the court of Em-

peror Caligula, the unfortunate poets who failed to win a prize had to lick out their own compositions.

Pens in those days were also different from ours. They were made of reed, cut to the length of a lead pencil, sharpened at the end and split. Without this split end the pen would not have worked. Try writing with a pen which has one half of its point broken off. It won't write. If both parts are there, they form

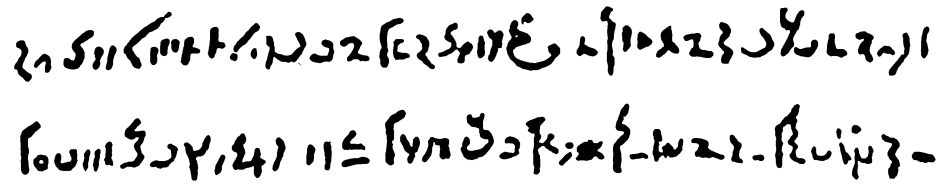
a little canal along which the ink flows in a tiny, even stream. If you want to make a wider mark you press down harder on the end of the pen to enlarge the "ink aqueduct" and increase the flow of ink. The man who first thought up the idea of splitting a pen point was a very clever person.

On the walls of the pyramids there are still preserved many pictures of Egyptian scribes. Most of them are young men, sitting on the floor, holding a roll of papyrus in the left hand and a reed pen in the right. The scribe usually has a pair of extra pens behind his ear, just as many clerks do nowadays.

I'll tell you a story I know about one of these scribes.

If we glance into the roll which the scribe holds in his hands, we shall be surprised to notice that the writing which covers the page is not at all like our own well-known hieroglyphics. It is a kind of scrawl not in the least like the fine pictures which we are accustomed to see on the walls of tombs and temples.

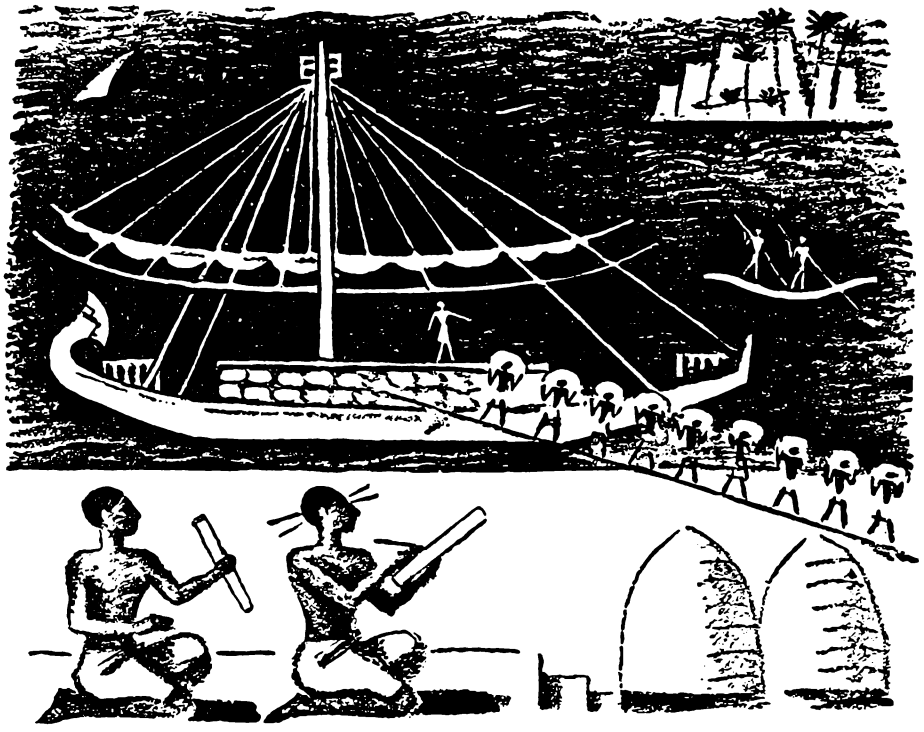
It is not hard to see the reason for this. It was



much simpler to write on papyrus than to carve on stone. One could do in one minute on papyrus what it would take half an hour to do on stone. It is, therefore, not to be wondered at, that on papyrus the hieroglyphics lost their accurate and beautiful outlines. Rapid writing altered all the lines, simplified all the drawings. Priests still thought about the beauty of their writing and carefully drew out every line. But ordinary people, who did not belong to the priestly caste, thought only about getting through as quickly as possible. So that finally there were three kinds of writing among the Egyptians:

hieroglyphics, priestly writing, and ordinary writing.

See what a revolution the discovery of papyrus made in Egyptian writing!



Egyptian Scribes

The scribe about whom we are going to tell the story uses the ordinary writing. He writes down the amount of grain the workers in white aprons are putting into the big storage bins. The work is going so fast that the scribe scarcely has time to write down what the clerk in charge of unloading the grain calls

out to him. How can he take the time to put in every little flourish? Along the brick stairway the workers come up to the platform built over the storage bins, with their cupola-shaped covers. They bring up their baskets full of millet, pour them through the hole in the top of the cover and hurry back for another load, stepping out of the way of the next laborer coming up with another full basket.

But at last all the grain has been measured and poured into the bins. The scribe collects his pens, rolls, and ink-well and goes along with the workers to the street. The houses are so high that they leave only a narrow little strip of sky above the street. This is where the rich people live. The little huts of the workers are out in the edge of the town.

Some of the workers stop in at beer halls on the way home to drink beer with their friends or have a glass of a stronger drink still which they made from the palm tree leaves. But the scribe, Nsisuamon, doesn't stop at a beer hall to-night. He goes home in a sad mood. It is still ten days until the next payday and he has already spent his last wages a long time ago. He hasn't any bread or millet or oil at home and there is no one from whom he may borrow either. And to think that there are some scribes who own big country places and fine town

houses! There's the scribe Nahmut, for instance, who has charge of the royal warehouses. They say that he has stolen so much that now he's the richest man in the city. It seems that an honest man is doomed to starve!

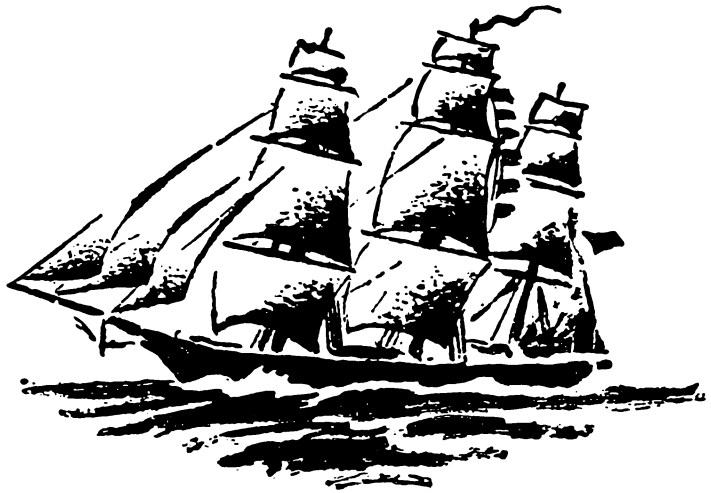
Nsisuamon remembers the seven years which have passed since he finished school. Seven years of want and deprivation! This was not the future they prophesied for him when he was in school. There wasn't a pupil in the class more able than Nsisuamon. He learned to read and write more quickly than any of the others. And in numbers no one surpassed him. He could repeat word for word the whole arithmetic book and the geometry too, which had this inscription on the first page, "Means which will make it possible to understand all dark things, all the secrets which are shut up in things."

Nobody could figure out better than Nsisuamon how to divide a hundred loaves of bread among five people in such a way that two of them would get seven times as much as the other three. And now it looked as if it were not in text books only that things were divided unjustly but in real life too. And poor Nsisuamon had not the luck to be one of those who get seven times as much as the others.

However, Nsisuamon did not give himself up to his gloomy thoughts very long. He was still young

and strong, he had a good head on his shoulders; why should he despair? To be sure he hadn't yet got a very good start in life but sooner or later people would recognize his merits and then, then life would be quite another matter!

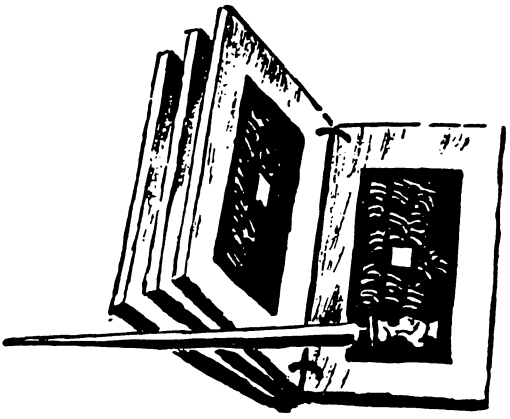
He went cheerfully on to his ramshackle hovel where his loving wife was waiting for him with their six-year-old son who was going to school and learning to be a scribe, too. His little hand could already trace out the clumsy curves and hooks on the papyrus scroll.



CHAPTER III

Wax Books

A WAX candle—that is a thing we all know about. But a wax book to-day would be a rarity. A book



A Wax Book

which, if you please, can be melted like butter would be a more remarkable kind of book than the brick books or ribbon books that we have been hearing about. Few people know that wax books, which

were invented by the Romans, were in use almost up to the beginning of the last century, up to the time of the great French Revolution.

You can see in the picture how a wax book looked. It was made up of a number of little tablets of about the size of our pocket note books. Every tablet was hollowed out in the centre making a rectangular place which was filled with wax, either yellow or colored black. At the two inner corners there were holes punched, through which cords were threaded, fastening the tablets into one little booklet. The outsides of the first and last tablets had no wax on them so that when the book was closed there was no danger that the writing on the inner surfaces of the tablets would be rubbed off.

How did people write on these wax tablets? Certainly not with ink. A little steel rod was used, called a *stylus*. One end of it was sharp pointed and the other end was rounded. They wrote, or scratched rather, with the sharp end, using the rounded end as an eraser. This is one of the ancestors of our erasers.

Wax tablets were very cheap. So they were used for scratch pads, making notes, doing sums and such things. Papyrus, which was imported into Rome from Egypt and was expensive was used only for books.

These tablets were good for another reason, because they could be used for a long time. When a Roman wrote a letter on a wax tablet he usually got the tablet back with the answer to his letter written on it. One could write on them innumerable times, rub out what was written with the blunt end of the *stylus,* and write again.

"Make frequent use of the blunt end of your stylus!" was the advice given to young writers in those days. We still say that a writer has a good "style" when he writes well, although the *stylus* long ago went out of use as a writing implement.

The fact that wax could be easily rubbed smooth was not always a good thing. It sometimes happened that important, secret letters would arrive at their destination with their contents entirely rubbed out by the people through whose hands the tablets had passed on the way. To prevent this, people sometimes poured another layer of wax on top of the real letter and on this extra layer wrote some nonsense, such as: "How-do-you-do? Are you in good health? Come to dine with me," etc., etc. When a person got a letter like this he would carefully remove the upper coating of wax and read the real letter which was written on the lower layer. That is, letters in those days might be either one or two storeyed, like houses.

The Latin letters which had been straight and shapely on stone, had curved a little more on papyrus, became on wax almost illegible scrawls. Only a scholar, learned in paleography, can read these Roman letters written on wax. We ordinary people can't make anything at all of these curves and crooks.

Try making a wax tablet yourself and write something on it. You will see how hard it is to make the letters correctly on wax, especially if you write fast.

It is only since the invention of lead pencils and cheap paper that we have been able to get along without wax tablets. A few hundred years ago every school boy had a wax tablet hanging from his belt. A large number of these tablets, written on by school boys, were found in the sewer of the Church of St. James in the city of Lübeck. They found here a number of *styli* too, some knives for cleaning parchment, and the canes with which teachers used to beat the pupils over the knuckles. For you must know that in those times pupils were beaten unmercifully. In place of saying, "I went to school," people used to say, "I went under the rod."

In a book written in Latin some thousand years ago there is a conversation between some pupils and their teacher.

Pupils: We boys beg you, our instructor, to teach

us to speak Latin correctly, for we are ignorant and speak it very badly.

Teacher: Do you want me to thrash you when I teach you?

Pupils: It is better to be flogged for the sake of learning than to remain ignorant.

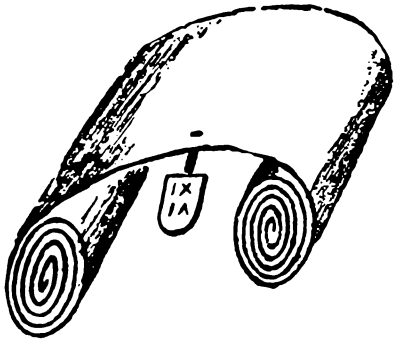
The conversation continues along the same line.

You must picture a school boy of that time as sitting cross legged, with his wax tablet lying on his knee. He holds it with his left hand and writes in it with his right what the teacher dictates.

School boys were not the only ones who used wax tablets. Monks wrote down in them the order of the church services, poets wrote their poems in them, merchants used them for keeping their accounts, court dandies for writing love letters to their ladies or challenges to duels. Some people had common beech wood tablets, covered on the outside with leather, for durability, and on the inside with dirty wax mixed with grease. Others had fine ones of beautiful wood. And there were some very elegant ones made of ivory. In Paris, in the 13th century, there was even a special shop for making these writing tablets.

What has become of all these millions of tablets? They have long ago been burned up or thrown into the trash heap, quite as we dispose of old paper.

And what a sum we would pay now for every tablet written by the Romans who lived two thousand years ago! But very few of the tablets of Roman times have come down to us. Most of those we have were found in Pompeii in the home of the banker Cæcilius Jucundus. This city was buried by ashes, together with the neighbouring town of Herculaneum, by an eruption of Vesuvius over two thousand years ago. If it hadn't been for the eruption of this volcano these tablets would never have come down to us. We have only twenty-four rolls of papyrus from Roman times. They were found in the ashes at Herculaneum. The most terrible catastrophe is nothing in comparison to the ravages of time—time which spares no one, which wipes out even the memory of human deeds just as a *stylus* smooths out the waxen tablet.



CHAPTER IV

Leather Books

WHILE papyrus was at the height of its glory a powerful rival put in its appearance—parchment. From the earliest times pastoral tribes used hides and skins of wild animals to write on. But leather only became parchment—a writing material—when people learned how to dress it properly. This came about, they say, in the following way.

In the Egyptian city of Alexandria there was a famous library which contained a collection of about a million papyrus rolls. The pharaohs of the Ptolemy dynasty were especially interested in increasing this library. For many years the Alexandrian library was the first in the world. But after a while there was another library that began to creep up on it, the library in the city of Pergamos in Asia Minor. The pharaoh who was ruling at this time resolved to avenge himself on this library in the

most ruthless fashion. He ordered that the export of papyrus to Asia should be cut off entirely.

The King of Pergamos met this by ordering the most skilled leather workers of his country to make a writing material of sheep or goats' skins which would take the place of papyrus. From this time on, the city of Pergamos was for a long time the chief source of supply of parchment for the entire world. Parchment was in many respects better than papyrus. It was easy to cut, for there was no danger that it would split up into different fibres, and it could be bent without cracking or breaking it. These advantages were not noticed at first. People rolled it up just as they did papyrus. But they soon noticed that parchment could be folded and made into folios and then sewed together into books. So at last the first real book appeared, made of separate sheets sewed together.

At first they soaked the fresh skins—sheep, goat, or calf—in water to make them soft. Then they scraped all the flesh off with a knife and put the skin in water containing ashes. The ashes made the hair so soft that it could easily be scraped off with a knife. The skin was now rubbed with chalk and smoothed down with pumice stone. The result was a thin yellowish skin, equally clean and smooth on both sides. The thinner the parchment the higher priced

it was. They succeeded in producing a parchment so thin that a whole roll of it could be put into a nutshell. Cicero, the famous Roman orator, tells about a tiny roll of parchment that he saw, which contained the twenty-four books of the Iliad.

The uneven edges of the skin were trimmed off, leaving a large sheet of parchment. This sheet was folded twice, making four smaller sheets, and several of these "quartos" were bound together into a book. Later they began to fold the skins four, eight, and sixteen times and got books of different sizes, a quarter, eighth, and sixteenth the size of the original sheet.

People began to write on both sides of the parchment instead of on one only, as on papyrus. This was also a great advantage. But in spite of all its superiorities it was a long time before parchment finally completely routed papyrus from the field. Parchment was used for making a fair copy of a composition, but when the manuscript got into the bookseller's shop it was there copied on papyrus scrolls. So an author's work travelled from wax to parchment and from parchment to papyrus and reached the readers on a papyrus scroll.

But the Egyptian factories made less and less papyrus all the time. And when the Egyptians were conquered by the Arabians the import of papyrus

into European countries was entirely stopped. And parchment was completely victorious.

It was, however, not a very glorious victory. The great Roman Empire had been ruined several hundred years before by the half wild tribes which came down from the north and east. Endless wars had reduced the once rich city of Rome to desolation. Every year, the number not only of educated people, but even of those who could read, grew less and less. And by the time parchment became the only materials on which books were written there were very few scholars left to write on it.

The great work rooms where the copying of books was done for the Roman booksellers had long since been closed. Only in monasteries, lost in the deep woods and deserted valleys, could a monk be found, here and there, who copied out some book for the salvation of his soul. Sitting in his cell on a high-backed chair the monk in the picture is painstakingly copying out the life of St. Sebastian. He doesn't need to hurry. He forms every letter carefully and correctly, not afraid of lifting his pen from the paper many times in his process. He uses either a reed or a feather pen sharpened and split at the end. Pens made of goose or crow feathers are becoming more and more common at this time.

The ink too is different from that used by the

Romans and Egyptians. An especially permanent ink had been devised for parchment which penetrated into the skin so far that it is impossible to erase it. This was made—as is often the case to-day—

A Monk Copying the Life of St. Sebastian

of the juice of oak gall, copperas, and resin, or gum arabic.

Oak gall is sometimes called "ink nut" and there are people who think that it is a nut which grows on an ink tree. But there is no such thing as an ink tree. These "ink nuts" are not nuts at all but a growth, like pimples, which sometimes appears on the bark, leaves, and roots of oak trees. Their juice is mixed

with a solution of copperas (those beautiful green crystals which you get when you dissolve iron in sulphuric acid). A black acid is formed to which gum arabic is added to give it consistency.

Here is a recipe for making ink, preserved in an old Russian manuscript of the period when paper had just been invented:

"Soak ink nuts in Rhine wine, in the sun or on a stove. Then pour this yellow fluid out through a towel, squeezing the ink nuts. Put it into a bottle and add copperas mixed with flour, let it stand for several days in a warm place, stirring it occasionally with a spoon, and you will get a good ink from the results.

"If when the pen is put to paper it is found that the ink is not black enough, add a little powdered resin to strengthen it, and then write whatever you wish."

This early ink was different from ours in one strange particular. When they wrote with it, it was very pale and grew black only after some time had passed. Our ink is better because we have added

some dye to it. Therefore, it can be seen by the person who is writing with it and not only by the one who is to read it.

While talking about ink we have forgotten our monk. Before he begins to write, he carefully lines his page. He does this with a lead stick—the great grandmother of our "lead pencil." First he makes a line down the page to define his margin then draws lightly across the page to keep his lines straight. His lead makes very weak marks, but it is quite sufficient for lining. Next he says a blessing and begins the first line. If he can draw, he first draws a big capital letter with which he begins the first word of the sentence. In place of a simple "S" he draws a picture of two cocks fighting. Some copyists made whole pictures to ornament the initial letter of the chapter. Sometimes they drew strange monsters: lions with human heads, birds with fishes' tails and every kind of fabulous animal. These ornamental letters were not done in black but were coloured red, green, and blue. Most frequently these first letters were red. The Russians still call the first line of a passage the "red line," although now in

their books all the letters are of the same colour.

There is another difference too: we set our "red line" in from the margin. In the Middle Ages the scribes did just the opposite, they set the red line out beyond the rest of the paragraph. That is, the red line was longer, instead of shorter, than the other lines on the page.

After drawing this first letter, or leaving it blank if he couldn't draw (later some one else would draw it in) our monk goes to work slowly copying out one line after another of the text. He doesn't hurry because he doesn't want to make any mistakes. Books were all written in Latin at that time and few people knew this language well. It would be very easy to make mistakes in copying words of which he did not know the meaning. And as a matter of fact, there *are* many mistakes in these mediæval manuscripts.

The copyist writes the letters very close together. Parchment is dear, he must be sparing with it. For, you see, it would take a whole herd of calves to make a thick book of calf skin like this. Sometimes it happened that pious laymen made presents of parchment to the monastery—some knight who had got a lot of gold by highway robbery, a merchant who had come safely back from a journey over the sea, some landed count who had come to pray to St.

Sebastian, the patron saint of the monastery. But this happened rarely. For the sake of economizing space the copyist shortened many words: for *people,* for instance, he would write *ppl,* for *Jerusalem, Jm.*

So he works on for weeks and months on end. It took at least a year to copy a book of five hundred pages. He gets a pain in his back from bending over his work, his tired eyes water, but the old man does not spare himself. For while he writes St. Sebastian looks down from heaven and counts how many letters the monk has decorated with his reed pen, how many lines, like furrows, he has plowed across the page. Every illuminated letter means one more sin remitted, forgiven. And the humble monk has many a sin charged up against him. If he isn't diligent in prayer, he will go to hell, to a burning furnace—right into the clutches of the devil.

An hour goes by—two hours. He longs to rest, to straighten out his back. But this is a wicked wish, whispered to him by devils. For every human being is surrounded by many devils. Not long ago a monk said that another monk told him that he had seen with his own eyes a whole brood of devils with rats' snouts and long tails. The only thing such creatures do is interfere with pious work—jostle his hand, tip over the ink-well, dance round right in the middle of a page.

Finally, the book is finished. Brother Hundoginus looks lovingly at the pages which look like a field covered with flowers. The bright red and blue letters stand out on every page. How much work went into that book! How many times, on sleepless nights, Brother Hundoginus got up from his hard bed, lighted his candle and sat down to work. The wind howled in the window shutters which covered the little window. Some one groaned and shrieked in the monastery grave yard. His goose quill pen squeaked. And line after line was traced across the yellowish page of the parchment. When his time comes, when the devil is disputing with St. Peter for the soul of the sinful monk, all these sleepless nights, all these lines, will be counted up and credited to him.

Hundoginus dips his pen into the ink for the last time and writes:

Glorious martyr, remember the sinful monk, Hundoginus, who has told the story of your great miracles in this book. May you help me enter into the kingdom of heaven and get me off from punishment for my sins.

In later centuries there were hired copyists, who were also, however, all members of some holy order. It was the custom of the copyists in these old days to end a book with a few lines about themselves. They also considered that copying was a pious work,

but at the same time did not forget to demand their earthly reward—pay for their work—also. Here is the way one devout old man ends his book:

In the year 1745 after the birth of Christ, on the 12th day after the holiday of St. Thomas, this prayer book was written by the hand of Johannes Herver of Lichtenstein, a citizen of the city of Zurich. The work was done by order of the master of my brother Martin, ruler of the order in Fussnach, for the salvation of the soul of his father and mother and all his family and fellow citizens. The price of the prayer book is 52 guldens. Pray God for the copyist.

Some scribes ended their books with merry little couplets, as:

Here ends the book! No more to say.
Now give the copyist his pay!

or

The book is done! 'Tis time, I think,
To give the scribe some cash for drink!

What did an old parchment book look like? It was usually a big heavy tome with a stout binding made of two boards, covered with leather on the outside, lined inside with some kind of cloth. The backs were reinforced with ornamental copper trimmings, which made the book look really more like a coffer than a book. It had copper clasps or locks,

too, which were necessary to keep the heavy book from warping.

There were more expensive bindings made of handsome brocaded morocco or velvet, ornamented with silver or gold bands and clasps, inlaid with precious stones. In the sumptuous book made for kings and princes not only the bindings, but every page too, glittered with silver and gold and precious

stones. Some books which have come down to us are made of parchment dyed purple, with letters of gold or silver. Time has turned the brilliant purple a dull violet, the silver has turned black. But such books must once have gleamed and shone like the sky at sunset.

A big, beautifully written and elegantly bound book was not the work of one man, but of six or

seven. One split up the leather roughly, another polished it with pumice stone, a third wrote the text, a fourth made the illuminated letters, a fifth drew the miniature pictures, a sixth went through it to see that there were no mistakes, a seventh did the binding. But it sometimes happened that one single monk would take a calf skin and, without any assistance from any one, turn it into a beautifully written and handsomely decorated manuscript.

CHAPTER V

Paper, The Conqueror

JUST as the papyrus had to yield in its time to parchment, so parchment had finally to give way to the material with which we are all familiar, paper. The Chinese invented paper. About two thousand years ago when, in Europe, the Greeks and Romans were still writing on Egyptian papyrus, the Chinese knew how to make paper.

The material which they used for making paper was bamboo fibres, certain kinds of grass, and old rags. They put this material into a mortar and rubbed it up into a pulp by mixing it with water. They then moulded this pulp into paper. For moulds they used a frame with a net-work bottom made of bamboo sticks and silk threads. They poured some of the pulp into the mould and shook it in every direction so that the fibres would get tangled up together and form a mat. The water ran

Chinese Making Paper by Hand

through the net and left only the dry paper sheet. This was carefully removed and spread on a board to dry in the sun. They then put a pile of dried sheets under a wooden press. The Chinese still use this hand method of making paper.

The Chinese are an amazing people! From paper shades to books and porcelain vases they have always shown an enormous amount of patience and ingenuity. Every time I see a Chinese selling lanterns or fans or lamp shades on the street I remember that

this nation was ahead of all the European nations in the invention of porcelain, printing, powder, paper! . . .

Many years went by before paper came from Asia to Europe. This is the way it happened: In the year 704 the Arabs conquered the city of Samarkand in Central Asia. Along with other booty they brought back from there the secret of making paper. In the countries conquered by the Arabs, Sicily, Spain, Syria, paper factories sprang up.

Many centuries passed before paper factories or paper "mills" as they called them, appeared in Europe. In the 13th century there were some such mills in Germany, in France, and in Italy. German merchants who came to the city of Novgorod to trade, brought paper of Italian manufacture into Russia. But later, Russia also had "paper mills" about thirty versts from Moscow in the village of Kannino.

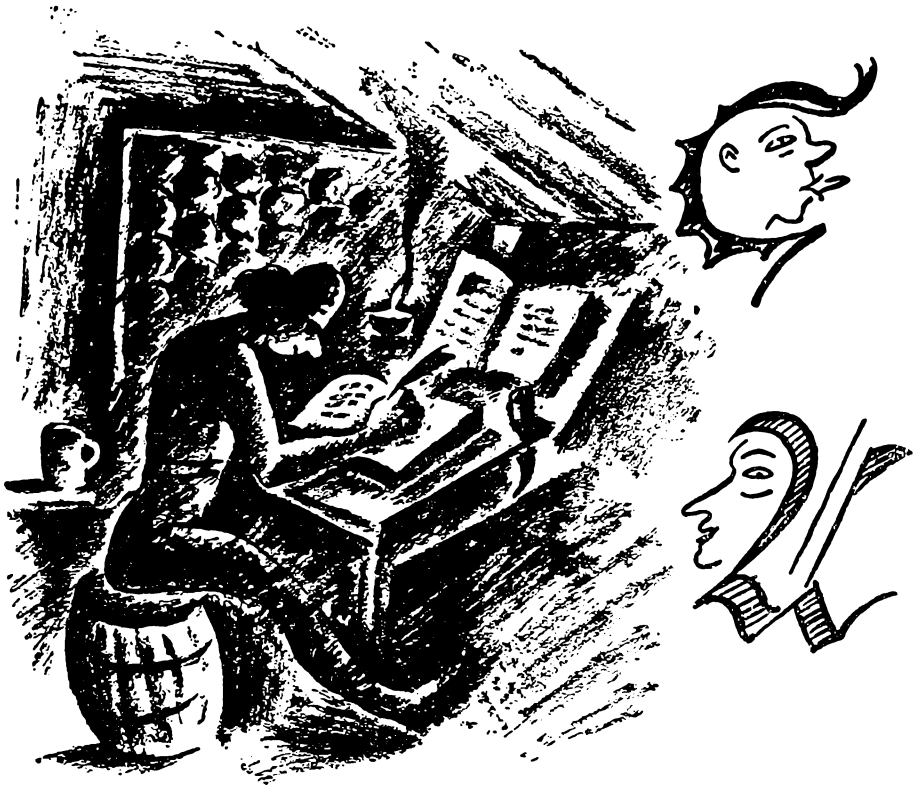
So paper reached Russia at last coming from China, through Samarkand, Syria, Italy, and Germany—going almost all the way round the world. On the way there were changes in the material used to make paper. In Europe they began to make it of old linen rags. At first people did not recognise the worth of paper. They wrote on it only things which it was not necessary to preserve any length of time. For books they still used parchment. But paper kept

taking the place of parchment more and more and people learned to make it stronger and better. Some one tried writing a book on paper. But to make it more durable he inserted a sheet of parchment after every second folio. Another hundred years passed and a parchment book became a rarity.

It could not be otherwise. Now it was not, as formerly, only monks who were educated. Everywhere schools and universities were springing up. Young people, eager for learning, thronged to the university cities. In Paris students occupied a whole quarter on the left bank of the Seine, and it is still called the "Latin Quarter." All this noisy, gay, always-hungry crew had to have books and note books. How could a poor student get money to pay for parchment? So people began to supply our learned young friend with cheap paper books.

And now books were not written exclusively by pious monks but by care free, pugnacious students. A student wasn't very particular about beauty or legibility. He often ornamented the initial letters with ugly faces, comically sticking out their tongues, or with fat-bellied little animals caricaturing their professors. He had very little reverence for books. On the margins of his text books he drew ugly heads and wrote impertinent inscriptions under them, such as "fudge," "nonsense," "you lie," etc. Take a

look at him! He is sitting at home in his tiny attic room, writing. Before him stands a horn-shaped ink-well, stuck through a hole in his table, a smoking



A Student at Work Copying

oil lamp, and several goose quill pens. There is no heat in the room although it is late in the autumn. Night before last our student tried to steal several sticks of wood from a barge tied up at the landing, but he was caught by the night watchman who belaboured him well for it. All he has to eat in the

house is a crust of stale bread and a pitcher of water.

He looks like a lean and ragged monk. His shaven crown—tonsure—shows that he has finished the beginning school. But there is nothing of the monk about him except his tonsure. Cuts and bruises on his face show that he has recently been engaged in a fight, probably with the journeymen of some shoe maker's shop.

The student's life has been a hard one so far. First the monastery school, floggings, being cracked over the knuckles with a ruler, beatings of every description. Then wandering through the country from estate to estate as an itinerant teacher. Sometimes he got a little pay but oftener than not he went hungry and spent the night in the gutter by the roadside, or stole a sleepy chicken from a peasant's hut. Later the belfry, where he spent six months ringing the bells on holidays to call the people to church. Finally the big city, the university, his fellow countrymen who took him into their company and nicknamed him "Long Pope," violent discussions of all kinds of learned subjects, drinking bouts and fights. The worst of all is that he never has a cent in his pockets. Once in a while he gets a little work such as copying out a missal or psalter for some citizens who live in his neighbourhood.

All these thoughts, one after the other, ran

through the mind of the student. His hand moves slowly over the paper. His head falls to the table and his regular snoring takes the place of the scraping of the pen on the paper. The little lamp smokes and blackens the walls of the room with soot. Impudent rats run about the room and squeak in the corners. They are after the crust of bread—the student's next day's dinner. But he hears nothing. He sleeps and dreams of the round hat of the learned baccalaureate which he hopes to wear next year.

But about this same time, in the German city of Mainz, Johann Gensfleisch of Gutenberg was looking at the first book he had just printed—the first book ever printed by a printing press. True, it had no capital letters. These were put in by an experienced scribe, but all the rest of the text was printed on a printing machine. In the form of the letters and arrangement of the text, the book looks very like the ones made by the copyists. Still any one can see the difference at a glance. The legible black letters stand up straight and even like soldiers on parade. In a few centuries there will not be a single book copyist left in the world. Books will not be copied by poor students or pious monks, but by steel giants—printing presses.

The invention of printing further increased the

demand for paper. Every year more and more books found their way from the printing presses to the shops of the book-sellers. Finally it seemed that there were not going to be enough rags to make all

Gutenberg Printing His First Book

the paper required. Some other material must be found. After many experiments they found that paper could be made from wood. Now only the higher grades of paper are made of rags. All our foolscap paper, paper for newspapers, and wrapping paper are made from wood.

Paper doesn't look in the least like rags or wood.

But there is, really, a great resemblance between them. Take a good look at a broken match and a thread pulled out of a piece of cloth and you will see that they consist of very fine fibres. It is from these fibres that paper is made. You can easily see this yourself if you will tear off a little piece of paper and look at the edge of it in the light.

The manufacture of paper consists of beating and unravelling the rags and wood into separate fibres, removing all resin, grease, and dust, then arranging the fibres in a thin, even layer—a sheet of paper. How is this done? We'll begin the story from the very beginning. Some housewife threw away an old shirt, all falling to pieces with age. Next day a rag picker came into the yard and picked it up. He took it with the other rags he had collected to a warehouse. There they sort all the rags, putting the linen ones in one place, the cotton in another and the mixed ones in another. Then they pack them all up in bags and send them to the factory.

There the rags are first carefully steamed to kill all disease germs. For the rags come from everywhere, from dirty cellars, hospitals, garbage heaps. After this, they are dried and all the dust is beaten out of them. There is a special machine for this in the factory, which can clean thousands of pounds of rags in a day. What clouds of dust would be raised

if this were done by hand, with sticks! The cleaned rags are now thrown into a shredder and torn into tiny pieces. Now they must be freed from every foreign substance. For this they have a big kettle in which the rags are boiled with lye or lime. They are then bleached and ground to a pulp on a special machine.

The first half of the work is now done. The rags are reduced to a pulp consisting of tiny fibres. The hardest part is yet to be done—to mould this paper pulp into paper. This is done by a big machine. It is really not one big machine but rather a number of little ones. The paper pulp goes in at one end and finished paper comes out at the other. First the pulp goes into the sand box—a box with a screen bottom. While the pulp is passing through this box any sand which may be in it settles to the bottom. Then the pulp goes into a knot-catcher—a drum with holes in it, which is constantly agitated. The knots and lumps stay in the drum but the clean pulp goes through the holes and out onto a net, which reminds us of the net we saw in the Chinese hand workshop. Only this net is not shaken by hand. It is stretched over two rollers, like a driving belt, and constantly moves round the rollers carrying the pulp forward.

The wet paper sheet finally passes from the net

onto a strip of cloth which carries it to a series of rollers. Some of these rollers press out the water and others, which are heated on the inside by steam, complete the drying of the still damp paper. Finally there are knives, which cut the paper into sheets of the required size.

Perhaps you have been bored by all this talk about the manufacture of paper, but I am sure that if you could see it yourself you would not be bored. Imagine a machine which stretches from end to end of a huge room. There are hardly any people in sight, yet the work never stops but goes ahead at full speed. There are machines which produce over two hundred thousand pounds of paper per day. The net of such a machine travels as far in a day as the distance from Philadelphia to Harrisburg.

Paper made of wood is made in the same way. The only difference is in the first part of the work. Wood is unlike rags. Different machines and different methods are required to separate it into its fibres and free it from foreign substances. We'll begin from the beginning here too. A fir tree grew in the woods. In the winter they sawed it down, hacked off its green branches and sharp top and dragged it along the sled road to the river. Spring came, ice on the river thawed, the log was floated down the little river to a bigger one. There the logs were made

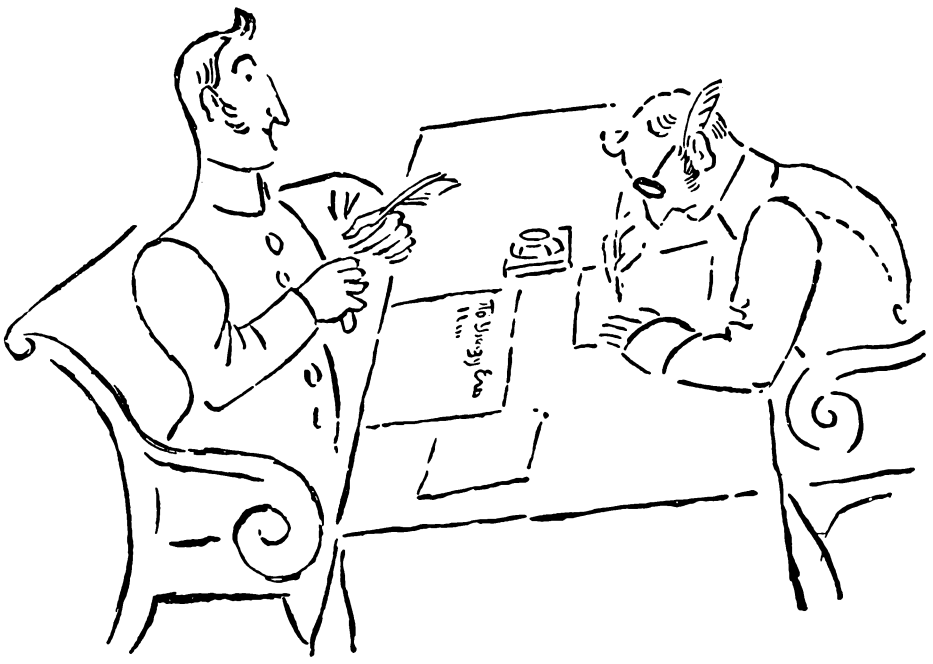
into a raft and the jolly raftsmen got on board to steer them down the stream. Day after day goes by. There in the distance are the smoke stacks of the paper factory. They drag the logs from the water up to the bank.

There the log's troubles begin! First they peel off its bark, then chop it up into chips. Next comes the sorting in the sieves and finally the boiling. Wood is not boiled in lye, as the rags were, but in acid. The wood is next rinsed and separated into fibres, knots are removed and finally it reaches the net of the big paper machine. So, passing from machine to machine, the fir tree finally becomes paper.

Our paper is good for everything. It has only one weak point, it is not very durable. This is caused by the bleaching process. They bleach paper by soaking it in a solution of bleaching lime which is very caustic. Paper unless made of pure rag, gradually gets more brittle and yellow. Will our books go down to people living some thousands of years from now? Perhaps the manuscripts written on parchment by some mediæval monk will outlive our books, printed on the most perfect of printing presses.

Our paper is very different from that of the first

books that were printed. But our pens are still less like those used in ancient times. We have kept only the name. This is often the case. Words live longer than the things for which they stand. "Pen knives," for instance, are never used nowadays to make pens.



The Goose Feather Pen

Six years ago we should have celebrated the centenary of the steel pen. In 1826 Mason invented a machine for stamping out pens. These pens began to be widely used at once, and crowded out the old quill pens which had served mankind for so many centuries.

It seems odd to think that our great grandparents still wrote with quill pens. In Fleet Street, London, there were clerks not long ago who were busy from morning to night making pens for the Law Courts. This was a very tiring work and required long practice. The pen had to be cut on the proper slant, sharpened, and split. This was harder to do than to sharpen pencils. Not long before the appearance of steel pens an inventor brought out a little pen, made of goose feather, to be put into a holder. That is, the penholder appeared before the invention of the steel pen and not simultaneously with it, as you might have supposed.

The lead pencil is about a hundred years older than the pen. A Frenchman, Jacques Conté, was the first man to make a pencil of a mixture of graphite powder and clay. The clay was added to make the pencil less brittle. This graphite was pressed out into little sticks and laid in grooves cut in a small slab of wood. Another slab of wood, with corresponding grooves, was placed on top of it and the two slabs glued together. This was then put through a planing machine which cut it up into six separate pencils. All that had to be done then was to polish them and pack them into a box.

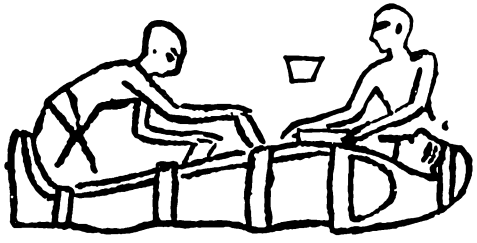
It seems likely that the pencil and steel pen will

not live so long as their predecessors, the *stylus* and the quill pen. The typewriter has already driven the pen out of larger institutions. And I do not doubt that soon every schoolboy will be carrying a little typewriter about in his pocket.

CHAPTER VI

The Fate of Books

THERE is a Latin proverb which says: "Every book has its fate." The fate of a book is often stranger than that of a human being. Take, for example, the works of the Greek poet, Alcman. This papyrus roll



has come down to us in the strangest fashion. It would have perished long ago if it had not been buried. It was actually buried, just as people are. The ancient Egyptians had a custom of putting into the grave with a mummy—the embalmed body of a man—all his papers and books. Letters, learned books, and poems of people who lived thousands of

years ago have lain on the bosoms of mummies down to our time.

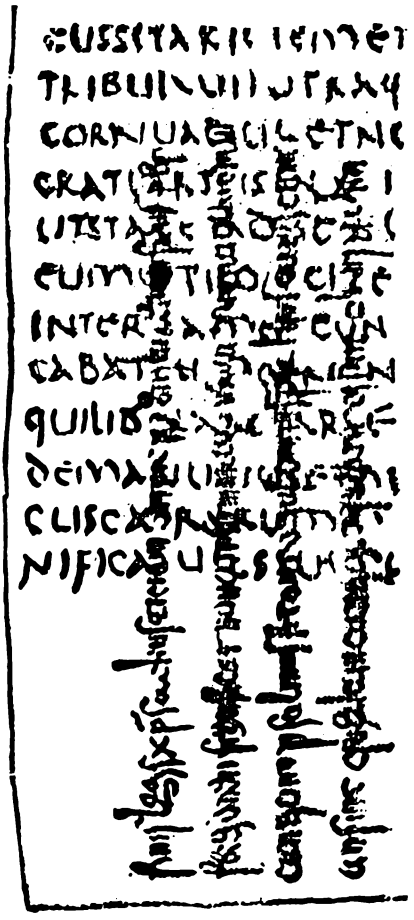
Egyptian graves have preserved many books which the libraries were not able to preserve. The largest library of Egypt, the Alexandrian library, was

Destruction of the Books

burned up when Alexandria was captured by the legions of Julius Cæsar. How many wonderful manuscripts perished when these millions of rolls were burned! All that has come down to us are some fragments of the catalogue of the library. Of all the books which once made readers laugh and weep, we have only the titles, like the names carved on the

tombstones of people long since dead and forgotten.

Still more astonishing is the fate of those books which were saved because people tried to destroy them. Or rather, they tried to destroy the writing, not the book itself. In the Middle Ages, when parchment was very dear, they used to scrape off the original text with a knife and write the lives of saints in place of some Greek poem or work of Roman history. There were men who specialized in doing this scraping—this destruction of books. Many books would have perished at the hands of these executioners if we had not found a way, in our time, of restoring these ruined books—or *palimpsests,* as they were called.



A Manuscript Showing Two Sets of Writing

The ink had penetrated so deeply into the parchment that even the most severe scraping could not

remove all traces of the text. If the manuscript is soaked in certain chemicals the blue or red outlines of the old writing come again to the surface. But don't be too delighted with this, because very often the manuscript, after this treatment, begins to turn black very fast and in the end the text becomes so dim that it is impossible to read it. This was the case when they used the acid obtained from oak gall for restoring these palimpsests. In every great library there are several of these manuscripts which have suffered two deaths.

They tell the story of one scholar who was restoring some palimpsests who purposely destroyed some manuscripts to hide mistakes which he had made in his translation.

In place of tannic acid they have recently begun to use other substances which bring out the old writing for a short time. While the text is thus visible they quickly take photographs and then wash off the acids. The latest reports are that photographs of the hidden writing on the palimpsests can now be taken without any chemical treatment.

But if books had their enemies, they had also their friends who have hunted for them in Egyptian graves, under the ashes of Herculaneum and Pompeii, and in the archives of monasteries. There is an interesting story about how one of these book-

lovers, Scipio Maffei, found the Verona library.

All that was known about the Verona library, which had contained valuable Latin manuscripts,

There Lay the Oldest Latin Manuscripts in Existence

was found in notes written by travellers who had been in Verona many years before Maffei's time. The only thing that he knew about this library was that two famous scholars, Mabillon and Montfaucon, had searched for it and been unable to find it. Maffei was undaunted by their failure. Although

he was not a learned paleographer, a connoisseur of manuscripts, he set eagerly to work on his search. Finally he did find the library in the very place where the former scholars had looked for it in vain—in the library of the monastery in Verona. The books were not *in the cases* of this library, and no one before Maffei had thought of climbing up on a step ladder and looking *on top of the cases,* where all these precious manuscripts had been lying in dust and disorder for many years. Maffei almost fainted with delight. There lay the very oldest Latin manuscripts in existence!

Some day I shall write a book about the adventures of books: about the books which were burned up at the time of the burning of the library of Alexandria, about the books which have been lost in monastery libraries, about the books which were burned in the fires of the Inquisition, about the books destroyed in times of battle.

I close the last chapter with a regret that I have told so very little about so wonderful a thing as a book.

The End

BLACK ON WHITE

BLACK ON WHITE is the story of books, a fascinating story that takes one to China, Egypt, ancient Rome, and many other places. It tells how man has slowly improved his ability to communicate with others. This index will help you to locate answers to some of your questions.

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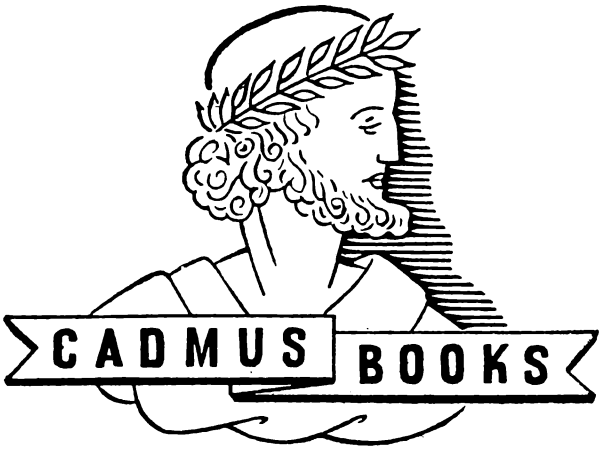
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